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MASSACHUSETTS AGRICULTURAL COLLEGE

TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1894.

PART I.

BOSTON:
PRINTED FOR THE SOCIETY.
1894.

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CHAPEL 1894-95

The following papers and discussions have been circulated to some extent in the form of slips reprinted from the reports made by the Secretary of the Society in the Boston Transcript. As here presented, the papers are printed in full, and the discussions are not only much fuller than in the weekly reports, but, where it appeared necessary, have been carefully revised by the speakers.

The Committee on Publication and Discussion take this opportunity to repeat what they have before stated, that the Society is not to be held responsible for the certainty of the statements, the correctness of the opinions, or the accuracy of the nomenclature in the papers and discussions now or heretofore published, all of which must rest on the credit or judgment of the respective writers or speakers, the Society undertaking only to present these papers and discussions, or the substance of them, correctly.

J. D. W. French,
C. Minot Weld,
B. M. Watson, Jr.,
Committee on Publication and Discussion.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, January 6, 1894.

A duly notified stated meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

This being the commencement of the term of office of the new board of officers and standing committees, the President delivered the usual annual address, as follows:

ADDRESS OF PRESIDENT KIDDER.

Ladies and Gentlemen:

Another year!

It is hard to be spontaneous when you know a whole twelvemonth ahead on what day and at what hour you are expected to speak.

It has gradually grown upon me that our Society would be better off, on the whole, if the make-up of the committees changed a little more from year to year. Now, do not misunderstand me: I am not aiming at any particular committee, much less at any individual. In the report of the nomination committee in 1892, it was recommended that the term of office of your presidents be limited to two years. I am now free to confess I think this was beginning at the wrong end of the question.

Seriously, I think it requires one year for your presiding officer to find out what is wanted, so that practically his influence is not felt before his second year. Then, if you find you wish a change,

make it, by all means, but the point I am trying to make is that it is not desirable to have any rule under which you are obliged to change, whether or no.

But to go back to your standing committees. Here the natural tendency is to be guided by precedent — habit. And here I think, perhaps, is where a limit of term might be applied. Again, not as an inviolable rule, and in this, as in the President's case, I should advise more than two years, but, perhaps, say four. No one's feelings need be hurt if there were some understanding that changes were to be the rule rather than the exception.

You do not care to have me give you a mass of statistics showing the condition of the Society. Its condition is much the same as last year; the losses sustained through the hard times tell, of course, to a considerable extent, and the possibility of further losses must be borne in mind. We should always be on the defensive in this respect.

It is a year since the Executive and Finance committees were asked to try to find you more room. The question, already difficult, has been made more so by the panic, and I hope you will not doubt my word that every effort within reason has been made, and that you will still trust the matter in the same hands. Meanwhile I think it should be our policy to do the best we can with what we have. It cannot be said that any needed repairs have been neglected during the past year. Only while we are talking of the possibility of decided improvement, we do not want to go to any unnecessary expense on the present property.

Glancing at the Treasurer's membership list, we see that we have now 789 members — six more than a year ago. But looking at our records for twenty years past we see that the number used to be much larger.

I cannot let this opportunity go by of asking you all to lend a hand in conducting the business of the Society. I refer especially, perhaps I do not need to tell you, to the frequent difficulty in getting a quorum at your business meetings.

I shall try to express my gratitude to you for your trust in me by my work in this new year.

The President reported from the Executive Committee a recommendation that the Society make the following appropriations for the year 1894 :

For Prizes and Gratuities:		
For Plants,		$2,000
For Flowers,		2,500
For Fruits,		1,800
For Vegetables,		1,100
For Gardens, Greenhouses, etc.,		500
Total for Prizes and Gratuities,		$7,900
For the Committee of Arrangements, this sum to cover all extraordinary expenses of said Committee,	$400	
For the Library Committee, for the purchase of magazines and newspapers, binding of books, and incidental expenses of said Committee,	400	
For the same Committee, to continue the Card Catalogue of Plates,	100	
For the Committee on Publication and Discussion, including the income of the John Lewis Russell Fund,	300	
For the same Committee, for a lecture by Dr. William G. Farlow, in 1891, the payment of which had been overlooked,	50	
For the Committee on Window Gardening (or by whatever name this Committee may be called), this sum to cover all incidental expenses of said Committee, and to be paid through the usual channels,	250	
For the salary of the Treasurer and Superintendent of the Building,	1,500	
For the salary of the Secretary and Librarian,	1,500	

These appropriations were unanimously voted by the Society.

The President also reported from the Executive Committee, the election of Charles E. Richardson to be Treasurer and Superintendent of the Building; and Robert Manning to be Secretary and Librarian, for the year 1894.

William C. Strong, Chairman of the Committee appointed February 11, 1893, to consider the arrangement of the Business Meetings and Meetings for Discussion so as not to interfere with each other, presented the following report:

The Committee report, recommending that during the lecture season no business shall be presented to the Society excepting on

the first Saturday of each month, unless by general consent of the members present.

The report was accepted and the recommendation was adopted.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion for 1893, reported the following awards for reports of Awarding Committees for 1892:

First Prize to John G. Barker, Chairman, for the Report of the Committee on Gardens, ...	$10 00
Second Prize to Arthur H. Fewkes, Chairman, for the Report of the Committee on Flowers, . . .	8 00
Third Prize to Mrs. H. L. T. Wolcott, Chairman, for the Report of the Committee on Window Gardening, .	6 00

J. D. W. French, Chairman of the Committee on Publication and Discussion for 1894, presented the Programme of Lectures for the year 1894.

These reports were severally accepted and adopted.

On motion of Francis H. Appleton it was

Voted, That the Committee on Publication and Discussion elected annually in October, be authorized to proceed, immediately after their election, to prepare for the course of lectures for the following year.

John G. Barker, Chairman of the Committee on Gardens, read the Annual Report of that Committee. Mr. Strong moved that it be accepted and referred to the Committee on Publication, and that the thanks of the Society be presented to Mr. Barker for the care in preparation of which it gave evidence; which motion was carried.

Mr. Barker acknowledged the kindness of the Society in passing this vote, and said that it had been a pleasure to him to serve on the Committee, and that in the visits of the Committee they had the pleasure of the company of others than members. He also expressed the hope that the Society would assist the Committee by calling its attention to places worthy of visits.

Arthur H. Fewkes, Chairman of the Committee on Flowers, read the Annual Report of that Committee.

David Allan, Chairman of the Committee on Plants, read the Annual Report of that Committee.

Mrs. H. L. T. Wolcott, Chairman of the Committee on Window Gardening, read the Annual Report of that Committee.

These three reports were severally accepted, and referred to the Committee on Publication.

The Secretary read a letter from Eliza S. Parkman, conveying the heartfelt thanks of the family of the late Francis Parkman, for the testimonial to him adopted by the Society.

The following named persons were proposed as members of the Society:

Clarence E. Grosvenor, of Charlestown, proposed by Robert Manning as a Life Member.

Mrs. Mary R. Keith, of Wollaston, proposed by S. A. Merrill, as an Annual Member.

John Ash, of Pomfret, Conn., proposed by Michael H. Norton, as a Life Member.

The following named persons, having been recommended by the Executive Committee, were on ballot duly elected to membership in the Society:

Arthur E. Whitney, of Winchester,
Nathaniel I. Bowditch, of Framingham.

The President announced that the Schedule of Prizes for 1894, was ready for distribution, and also that the series of Meetings for Discussion the present season, would commence on the next Saturday, with a lecture on Fungi, by William C. Sturgis, Ph.D., Mycologist of the Connecticut Agricultural Experiment Station; this lecture being delivered on the John Lewis Russell Foundation.

Adjourned to Saturday, February 3.

MEETING FOR DISCUSSION.

Saturday, January 13, 1894.

A Meeting for Discussion was holden today at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The following lecture was delivered on the John Lewis Russell Foundation:

Fungi.

By William C. Sturgis, Ph. D., Mycologist of the Connecticut Agricultural Experiment Station, New Haven.

The subject upon which I have been asked to address you is a many-sided one, and after accepting the invitation conveyed to me by your Committee, I found myself somewhat at a loss to decide from what standpoint — morphological, systematic, or economic — you would desire me to treat that vast and complex group of plants which we call Fungi. I finally concluded that I should not go far astray if I attempted to present the subject in its economic aspects, and confined myself largely to a consideration of the cause, nature, and means of prevention of fungous diseases to which many of the higher plants are liable. But inasmuch as some degree of knowledge concerning the nature, habits, and affinities of the fungi themselves is essential to any understanding of the means which have proved successful in combating their attacks, I am compelled, even at the risk of being tedious, to touch upon these points, and to follow the example of the small boy who, when asked at dinner whether he would take pie, pudding, or jam, answered that he would take as large a portion of each as was compatible with the time at his disposal.

We might open our subject then, with the question, What is a fungus? Not long ago a friend of mine was lecturing at a farmers' institute upon fungous diseases of plants, and after he had finished and had invited questions, an intelligent farmer in the audience requested to be informed "how he could catch them in their holes." The lecturer was non-plussed for a moment until further investigation elicited the fact that the inquirer had in mind the depredations of woodchucks, under the impression that "fungi" is a technical term for any and every agency destructive to vegetation. Again, I received last month a letter from a lady of agricultural tastes, informing me that she had discovered "a remedy for thwarting the ravages of the parasite known as the 'Fungi', and causing it to become extinct." I fear what the consequence might be of informing her of the fact that there are at present more than forty thousand species of described fungi. Our inquiry as to the nature of a fungus is therefore a pertinent one.

All known plants are divided into two great groups — the Phænogams, which include all the large vegetation of temperate

regions, and are characterized by the production of flowers and seeds; and the Cryptogams, or non-flowering plants, which in place of seeds produce reproductive bodies, generally of minute size and homogeneous structure, which contain no embryo or plantlet, and are called *spores*. This second group includes Ferns, Mosses, Algæ or Seaweeds, and Fungi. Among these lesser groups of Cryptogams, the Fungi are distinguished by certain well-marked characteristics. All the higher plants, with few exceptions, are provided with a green coloring matter called chlorophyll, through the agency of which the plant is enabled to assimilate inorganic materials, — water, the chemical constituents of the soil, and the carbonic dioxide of the air — and transform them into the starches, sugars, oils, etc., necessary to the life of the plant.

Fungi are completely devoid of chlorophyll, and are therefore unable to assimilate inorganic matter, but must depend for their subsistence upon materials already elaborated by other plants or by animals. We are thus enabled to subdivide the group of fungi, although this division is purely artificial. Those which live upon dead, organic material, we call *Saprophytes;* those which find their nourishment in or upon living plants or animals we call *Parasites;* these distinctions are not, however, strictly accurate, since some species can exist either saprophytically or parasitically, and others are saprophytes at one period and parasites at another. It is to this parasitic nature of many fungi that they owe their economic importance.

A fungus then is a plant as much as the tree, shrub, or herb upon which it may grow. It possesses no green coloring matter capable of assimilating inorganic material, and must therefore live upon material already prepared. This material it secures from living or dead plants or animals, and, if from living plants, it may by its parasitic nature do great damage to the host. Finally, it is reproduced normally by means of spores which differ from seeds in that the former are of simpler organization and contain no embryo.

Let us now turn our attention to the vegetative part of a fungus — that part which corresponds to the roots, stems, and leaves of higher plants.

If the earth be removed from around the base of a common mushroom, a careful search will reveal the presence of delicate white strands traversing the soil and giving rise to the conspicuous

stalk and cap of the mushroom. These white strands constitute the whole vegetative system of the fungus and are familiar to us under the name of "*spawn*." If a portion of these strands is examined under a microscope, it is plainly resolved into a number of very delicate, transparent threads, or, more strictly, tubes, each of which is divided up at intervals by cross partitions. Each tube is technically called a *hypha;* the hyphæ together constitute the *mycelium*, and it is this mycelium which composes the vegetative system of every fungus. It is usually inconspicuous because of the minute size of the component hyphæ, and because, from the office which it serves, it is usually buried in the substratum upon which the fungus grows; nevertheless, either as single hyphæ or aggregations of hyphæ, it is always present.

Coming now to the reproductive portion of fungi, it would be utterly out of the question in the course of a single lecture, even to enumerate the variety of spore-forms and their marvellous adaptations to rapid reproduction. I must therefore content myself with certain broad, and therefore imperfect, generalizations. The two principal groups of fungi with which the economic mycologist has to do, are the *Basidiomycetes* and the *Ascomycetes*, scientific divisions based upon the method of reproduction. The former are characterized by the fact that at maturity the hyphæ or the highly developed mycelium give rise to numbers of club-shaped bodies called *basidia*, usually arising side by side, closely compacted, and producing on their tips either two or four spores. This spore-bearing layer may either be exposed to the air by special means adapted to that end, or it may be completely enclosed in a leathery case formed from the differentiated and toughened hyphæ. In the former category are all our mushrooms and toadstools; in the latter are our common puff-balls. Some idea of the enormous number of spores produced by the toad-stools and puff-balls may be obtained from the statement that each exposed surface of every one of the gills which occupy the lower side of the mushroom cap is composed of closely packed basidia, each bearing four spores measuring about 0.0003 of an inch in length; while the dust which issues in clouds from a ruptured puff-ball is composed entirely of similar microscopic spores. Each of these spores is capable of producing a hypha, mycelium, and finally the fruiting body.

In this group of Basidiomycetes — the mushrooms and puff-balls — a few species exist parasitically upon the roots of grape vines,

fruit trees, etc., but such attacks are uncommon; most of the species are simple saprophytes, and with this brief mention of the fact, we must pass to the second group, the Ascomycetes. In this group are found very many of our most pernicious parasitic fungi. Their parasitic effects are readily seen when a potato vine blights, or the familiar velvety brown blotches called "*scab*," appear upon the leaves and fruit of our apple trees. But the fungi themselves are very minute; they are never so conspicuous as the larger forms of Basidiomycetes, and hence they frequently escape notice, the diseased condition which they cause being usually attributed to some more visible agency.

Perhaps the most intelligible method of getting at the characteristic points of the Ascomycetes, will be to follow out the life-history of some common form. You are all familiar with a white or bluish-green mold which readily develops upon old cheese, bread, leather, and in fact almost any organic substance if kept in a damp place. If a portion of this mold be placed first in a drop of alcohol and then in water, and examined under the microscope, the hyphæ will be seen extending in all directions and forming an entangled mycelium. Here and there the mycelium will be seen to have produced delicate branches rising from the substratum into the air. The tip of each of these branches is swollen into a globular vesicle, on the surface of which are borne chains of spores, which seen separately appear colorless and transparent, but in the mass are greenish or bluish in color. If one of these spores, while still living, falls upon a substance suitable to its growth, it soon puts out a delicate hypha, which rapidly elongates, and branches profusely; these branches interlace and finally we have a typical mycelium, from which in due course arise the spore-bearing threads. So far the process of reproduction is simple enough. But the mycelium arising from the spore may produce reproductive bodies of another form. The tip of one of the hyphæ may become coiled in corkscrew fashion and, after being fertilized in a peculiar manner by a branch which grows up from below, it becomes enclosed in a network of hyphal branches; the latter become denser and externally hardened, and finally form small yellow knots, within which the spiral is completely enclosed. On breaking open one of these knots, which are plainly visible to the naked eye, being about half the size of a pin-head, the microscope shows that from the swollen cells of the original spiral, little spherical or club-shaped sacs have arisen, each containing

eight minute spores, which upon germination produce a mycelium and spores, thus completing the cycle. Each of these little sacs thus born in a special receptacle is called an *ascus*, and the spores within them are called *ascospores* to distinguish them from the aërial spores or *conidia*.

Here then we find the typical characteristics of the large group of ascomycetous fungi — usually of very small size — a vegetative system of delicate tubes or hyphæ, branching and interlacing to form a mycelium which is usually buried in the substance of the substratum; and a reproductive system consisting of minute bodies called spores, born either free in the air, on specialized branches of the mycelium, or contained in sacs called asci, which in turn are enclosed in special receptacles composed of the adjacent hyphæ modified in form and generally indurated.

I have spoken of a seemingly sexual process of fertilization as giving rise to the ascus-bearing spiral. This condition is undoubtedly typical of the Ascomycetes, but can no longer be considered as normal. In the vast majority of cases the ascospores and their receptacles are formed with no intervening act of fertilization, and it is not difficult to trace the general trend of development in the group. The ascospores are as a rule born in comparatively small numbers; they mature slowly, but are correspondingly resistant to unfavorable surroundings. The aërial spores or conidia on the other hand are produced in enormous numbers and are short-lived, but this latter condition is compensated for by the fact that they reach maturity very quickly and germinate within a few hours if the conditions are favorable. It is therefore by these means that fungous diseases are enabled to spread so rapidly. Moreover these spores are so minute as to be readily conveyed, sometimes for miles, by the wind, currents of water, or insects. We recognize then a distinct tendency throughout the group towards a repression first of sexuality; then of the slowly maturing, resistant ascospores, and the replacement of the latter by enormous quantities of delicate spores, borne free in the air, whence they can be carried in all directions, requiring but a short time for development, and germinating as soon as mature. It is an evolution toward quantity rather than quality, a fact of immense importance in the economic study of fungi. There are at least two other forms of spore which the typical ascomycetous fungus produces. Like the ascospores they are borne in closed,

or almost closed, hardened receptacles, but are not themselves enclosed in sacs or asci. There are therefore, four different stages in the life history of such a fungus, each characterized by a special form of reproductive body: first, the aërial spores or conidia, produced in enormous quantities in spring and early summer; second, following these, small blackish receptacles, more or less spherical in form, and visible to the naked eye, containing naked spores, produced by the hyphæ lining the receptacle, these spores being of two different kinds; and finally, in the same or different receptacles, small sacs or asci arising from the base of the cavity and containing a definite number of ascospores; these are usually brought to maturity during the course of the winter, and, germinating in the spring, complete the cycle by producing a mycelium and conidia. Such a perfect course of development is, as I have said, hardly normal. In the majority of cases the ascosporic stage is either very rare, or has been totally eliminated, the aërial conidia alone are known, and systematic students are compelled to group these forms by themselves, as though they were separate and distinct species, remaining content with classifying such imperfect forms under "form-genera" and "form-species." So also in many cases only the perfect or ascosporic condition is known; in fact it is rare to find a fungus of this group in which the complete life-history is known, though every year sees some form-species properly transferred to the perfect fungus of which it is merely a condition.

Before leaving this portion of our subject I must mention at least three other groups of fungi, which almost invariably exist as parasites upon the higher plants and are therefore of great interest to the vegetable pathologist. We have considered the Basidiomycetes or Mushroom group, in which all trace of sexual reproduction is lost; and the Ascomycetes, in which, roughly speaking, the spores are born free in the air on special stalks, or enclosed in sacs or asci contained in special receptacles, which may arise as the result of a more or less sexual process of fertilization. Between these two groups, and in a manner connecting them, are two smaller groups — the Ustilagineæ and the Uredineæ, the former including the so-called "*Smuts*," and the latter the "*Rusts*." The Ustilagineæ are characterized by their inconspicuous mycelium and the incredible number of spores produced, as well as by certain peculiarities in their development

which need not be described here. These fungi often attack the floral organs of wheat and other cereals, distorting the grains or transforming them into masses of black dust consisting almost entirely of the fungous spores. The familiar black masses covered with a grayish integument which are often found upon the stalks of corn, are caused by a species belonging to this group of "Smuts." The Uredineæ or "Rusts" are peculiar, in that they not only may produce several forms of spores, but these various forms usually occur on different host-plants and are strictly limited to those plants. If the leaves of the barberry are examined in the spring, they will often be seen to exhibit on their lower surfaces small yellow pimples, several of which occupy a spot a quarter of an inch in diameter. When these pimples are mature they open and emit a yellow powder — the spores of the fungus. Now should these spores fall upon a barberry leaf they come to nothing; if, however, they are carried by the wind or other agencies to the leaves of a member of the Grass Family, they germinate, the mycelium traverses the leaf, and presently we find the leaves streaked with a rusty color caused by the production of quantities of pale yellowish spores. These in turn are followed on the same leaves in autumn, by a black or very dark brown form of spore, differing from either of the other forms and yet belonging to the same fungus. Neither of these latter forms can reënter the grass, but alighting upon barberry leaves the yellow pimples are again produced in the spring. In like manner the familiar brown lumps, called "cedar-apples," which we find growing upon twigs of the red cedar and producing in the spring yellow, gelatinous masses, constitute merely one stage in the development of the fungus which produces the "rust" of apple leaves. Such a condition of things has of course led to endless confusion, and before the facts were known each stage received a different generic and specific name. Even now, with our increased knowledge, many mere form-species have to be retained as such, until thorough investigation has completed our knowledge of the life-history of the fungus in question. All these facts must be taken into consideration in any rational treatment of fungous disease. Thus, for example, we no longer recommend extensive treatment of apple trees for "rust," knowing that the same end can be readily and successfully attained by destroying neighboring red cedars whose presence is absolutely essential to the development of the "rust" fungus.

Finally, below all the groups thus far mentioned, is one known as the *Peronosporeæ*, to which belong those fungi known as "*mildews*." They are delicate, mold-like fungi, usually growing in and upon the leaves of higher plants, and in some cases producing an actual decay of the tissues attacked, as in the case of the "mildew" or "rot" of potatoes. Many members of the group exhibit a definite sexual method of spore-production, approaching in this particular certain aquatic fungi and algæ.

Doubtless a very natural question has ere this occurred to you. If these fungi and their spores are such minute and delicate organisms, how are they enabled to withstand the cold of winter and the drought of summer? The answer to this question is at the basis of much of our preventive treatment. Those fungi which produce ascospores, in closed receptacles, find such a condition a sufficient protection. If they have attacked leaves or fruit, they fall to the ground with the latter, and the developing spores remain protected by Nature, and by the surrounding refuse, ready to spring into pernicious activity with the approach of warm weather. Again, many fungi, under unfavorable conditions, produce what are known as "*resting spores*," spherical bodies, of comparatively large size and resistant qualities, protected by a dense and impervious outer coat. Such spores may retain their vitality for years, ready to germinate upon any favorable opportunity. Still again, the mycelium of many fungi — for example the "*black-knot*" of plum and cherry trees—is perennial. During the winter it remains dormant within the tissues of the plant attacked and is ready in the spring to produce a fresh crop of spores. Finally, the mycelium of fungi tends, under certain circumstances, to become twisted up into knots, often of large size, called "*sclerotia*." The exterior hyphæ of these knots become very much thickened and indurated, and in this sclerotial condition the mycelium of a fungus may retain its vitality almost indefinitely.

With all these facts in mind — the great number of fungi at present known to science, the high degree of development which they have attained in respect to organs of reproduction, and the success which has marked their varied adaptations to survival under unfavorable circumstances — we are led to wonder that any of our higher plants are able to resist these minute parasites. Doubtless the damage would be far greater, but for one fact.

These parasitic fungi are very exclusive in their choice of a host-plant; they are often limited to a single species, and generally to a single genus. The potato "mildew," for example, attacks only the potato and tomato; the "black-knot" occurs only on plum and cherry trees; one species of "smut" only on onions; another only on cereals, and so on through the majority of species of parasitic fungi. Were it not for this fact we might well despair of success.

Even as it is, there can be no question that the number of plant diseases has increased alarmingly within the past twenty or even ten years. Many of you remember when there was no such thing in this neighborhood as potato "rot," and the potato crop was far superior, both in quantity and quality, to what it is today. Ten years ago Delaware, New Jersey, and even Connecticut could compete successfully with the product of any peach-growing region; today, in places, the peach industry has been almost ruined by "yellows," and what fruit grows is of poor quality. Last year one-fifth of the oat crop of Idaho, valued at more than $120,000, was destroyed by "smut," and any of our crop reports will show us similar figures much nearer home. These are serious facts, but still, I think neither inexplicable nor wholly beyond our control. The increase in the number of fungous diseases may be due to one or more of many causes. It may be that distinct species of parasitic fungi, hitherto unknown to science, have appeared upon our cultivated plants — new species in the sense that they have been studied and named within the memory of the present generation. No doubt such species existed previously, but the number of expert specialists in this wide field of botany was very small twenty-five years ago, and the means of investigation comparatively inadequate. As an illustration of the rapid growth of botanical knowledge in this direction, it is striking to observe that a work recently published gives descriptions of 39,663 species of fungi, as compared with 11,893 species known in 1862, and that during the present year no less than 1,500 new species have been discovered. It must be remembered that the majority of these "new species" are merely imperfect, or form-species, and as their life-history becomes known will be denied specific value and placed under the name of their respective perfect forms; also that very few of them are parasitic, and hence of economic importance; nevertheless there can be no doubt that this cause has much to do with the increase in the number of

fungi known to cause diseases of economic plants. Again, our fathers were neither as observant nor as provident against loss as their experience has taught us to be, in certain directions. Crops were damaged or destroyed by blight or mildew, and their owners merely accepted the fact with philosophic resignation, laying the blame upon the weather, or some mysterious agency unintelligible to man and against which there could be no protection. Today we are not content with such conclusions. We subject the soil to chemical analysis to ascertain what element of plant-food it lacks, and that element we supply artificially. We examine the plants themselves microscopically, knowing that there are parasitic plants, practically invisible to the naked eye, but capable of doing immense damage under favorable conditions of temperature and moisture.

Still again, many parasitic fungi which cause a diseased condition of cultivated plants, are found to have originated on wild species related to the cultivated. So long as the fungus limited its depredations to the wild plants it was considered of no economic importance. As soon, however, as it transferred its attentions to the related cultivated plant, its effects became an object of concern, and that particular economic plant was said to be subject to a new fungous disease. Familiar examples of this are seen in the case of the "black-knot" of the wild cherry and plum, which when transferred to cultivated varieties becomes an object of dread to the fruit grower; and the common orange "rust" of the wild blackberry, which upon the cultivated varieties becomes a well-nigh ineradicable disease.

Finally, it is more than possible that the increase of fungous disease may be due to our methods of hybridization and so-called improvement of stock. Just as an athlete may become overtrained to the point of collapse, in case his training is directed toward the special development of only one manifestation of vigor, so is it possible to cultivate and concentrate the energy of a certain vegetable stock to such a degree in one direction, that it is vitally weakened in other more essential particulars, and made peculiarly susceptible to adverse circumstances, whether of climate, soil, or parasitic disease. This fact is slowly finding recognition in the case of apples, where pomologists are more and more turning their attention to the production of hardy and resistant varieties, rather than varieties which are remarkable for fruitage alone.

I said that the fact of the recent increase of fungous diseases could be at least partially explained, and I trust that I have made the matter as plain to you as it is to me. I further said that such an increase was not beyond our control. Let us then discuss as briefly as possible, how we may in a measure prevent the attacks of parasitic fungi. I say prevent rather than cure, because, as you will remember, the vegetative system of fungi is usually buried in the tissues of the leaves, fruit, or roots affected and is practically out of the reach of fungicides. As a rule all proposed treatment must be preventive rather than curative.

We recognize two definite lines of treatment of fungous diseases — the one hygienic, aiming to eradicate disease by the alteration of external conditions conducive to its spread; the other consisting in the application to the parts endangered, of some substance inimical to fungous growth.

Enough has been said regarding the nature and life-history of fungi, to show you that if we can destroy both the spores and the mycelium of a fungus while those organs are either dormant or have not yet reached maturity, we shall get at the root of the whole matter. Here a little common sense is of great assistance. Fruit rots and falls prematurely, usually because it has been attacked by a parasitic fungus; the same agency causes leaves to blight and fall from the trees. Such fruit and leaves are allowed to remain where they fall, because they are of no use. But the fungus within their tissues remains protected during the winter, develops slowly, and with the approach of warm weather produces its spores in vast numbers, each spore able to reproduce the fungus upon the budding leaves and young fruit of the tree immediately above it, if a slight breeze should cause it to lodge there. No preventive treatment of any nature in spring or summer will protect completely fruit and leaves so wantonly exposed to disease. If the rotten fruit be not allowed to remain where it falls it is usually fed to the pigs. The spores of the fungus pass uninjured through the alimentary canal of the animals, are voided with the manure, find their way to the compost heap, and thence are spread broadcast over our fields and orchards; and again we wonder that our summer treatment of the trees with fungicides is of so little avail. The only reasonable method to pursue is to gather carefully at the time of harvest, and at once burn, all diseased fruit and leaves.

But fungi are not reproduced entirely by their spores. In a great many cases, as I have mentioned before, the mycelium exists perennially in the twigs and branches attacked, as well as in the discarded fruit, and is capable of propagating the fungus under the return of favorable conditions. In the former case the unsparing use of the pruning-knife is the only reasonable cure. Familiar examples of such perennial mycelium are the "black-knot" of plum and cherry trees, in which case it is only necessary to watch the growth of one of the "knots" from year to year to convince yourselves that it renews itself annually from within the tissues of the branch; the dreaded "anthracnose" of raspberries, grape vines, etc.; also all of our more common "rust" fungi. Only by cutting out and burning all diseased tissue, can such diseases be eradicated. The destruction of wild plants which harbor dangerous parasites is another point of hygienic importance. Thus we can best protect our cherries from "black-knot" by destroying neighboring wild cherry trees infected with the disease. For reasons already explained the "rust" of apple trees may be completely eradicated by the destruction of adjacent red cedars.

Finally, most fungi require a considerable degree of moisture for their most rapid development. An unusually warm, damp season is accompanied by great fungous activity, and plants containing much water are peculiarly liable to fungous attack. This is perhaps more noticeable, and at the same time more readily controlled, in the greenhouse than in the field. In such cases thorough drainage, and the training of the plants so as to secure thorough ventilation and the access of air and sunlight will do more to prevent diseased conditions than any fungicide.

I have dwelt thus extensively on the hygienic methods of preventing disease, because I believe them to be of the utmost importance, and deserving of far more attention than they usually receive. I should, however, belie my own experience, did I not emphasize the value of fungicides to supplement all hygienic treatment. For convenience we may divide fungicides into three classes — liquids, powders, and vapors. Of these the first and second alone are adapted to field work, while the third is invaluable in the greenhouse or any enclosed space. Let us consider first the liquids.

As is well known, the salts of copper exercise, when applied in sufficient quantity, a most harmful effect upon all vegetation, the

cheapest and most convenient form being the sulphate, commonly known as "blue vitriol." The delicate nature of fungi renders them peculiarly susceptible to the action of this chemical, recent laboratory experiments which I have been conducting, showing that comparatively resistant fungous-spores failed completely to germinate in water containing only 0.03 of one per cent of copper sulphate. If, therefore, a solution containing four pounds of copper sulphate to twenty-five gallons of water, be sprayed upon fungi or their spores, every spore which it touches will be killed. We act upon this principle in our preliminary or winter spraying. In March or early April, before the buds have begun to swell, we give the trees and the subjacent ground, a thorough spraying with a simple solution of copper sulphate made in the proportions just mentioned. The spores which have developed in the refuse lying on the ground, or which have lodged in the cracks and crevices of the bark, are thus largely destroyed. We start with our orchard or garden comparatively free from the germs of disease, and have only to persuade our neighbors to exercise the same sensible precaution. Unfortunately, despite all our efforts, fungi will appear later to some degree. If, when the trees are in full leaf, we should treat them with a solution of the former strength we should indeed prevent fungous attack, but only by destroying the leaves as well. We, therefore, make use of a solution containing three pounds of copper sulphate to twenty-five gallons of water, and further to prevent any possible damage we add to the solution sufficient lime (from two to three pounds, mixed with water to a thin wash) to change all the copper sulphate into the less poisonous hydroxide of copper. We thus get what is known as the *Bordeaux mixture*, the cheapest and most generally effective of all known fungicides. Others (based upon the solubility of the carbonate of copper in ammonia), are the simple solution of five ounces of the carbonate in three parts of ammonia, this being subsequently diluted with water to forty-five gallons, and also the modified formula for what is called *Eau Céleste*, consisting of one pound of sulphate of copper, and one and one-fourth pounds of carbonate of soda, dissolved in one pint of ammonia and diluted with water to twenty-five gallons. These are both clear solutions and therefore do not tend to clog the spraying nozzle as the Bordeaux mixture does when carelessly made with lumps of lime poured into it. Their principal value is

in the late spraying of fruit, in which case the Bordeaux mixture tends to spot the fruit somewhat.

One more liquid fungicide is deserving of mention — a solution of one pound of potassium sulphide in forty-five gallons of water. This is a cheap fungicide and in some cases moderately effective. The Bordeaux mixture, however, presents many advantages over any of these fungicides. The excess of lime which it contains renders it very adhesive, so that a heavy rain is necessary to wash it off from the foliage, and usually three treatments only are required during the season. Furthermore, the presence of lime allows of the addition of arsenical insecticides, such as Paris Green or London Purple; the arsenite retains its insoluble form and no burning of the leaves results, while its action as an insecticide is unimpaired, and we have a cheap and effective combined fungicide and insecticide. This is not true of any solution containing ammonia. If the arsenite be added to such a solution it is rendered soluble by the ammonia, and extensive damage to the leaves is sure to result from its application.

Lastly, the Bordeaux mixture presents one very peculiar property. It has been repeatedly proved that if the mixture be applied to potatoes, for example, the latter experience a benefit over and above that caused by the prevention of the "mildew" or "rot." Even when no disease is present the vigor of sprayed vines is greater than that of adjacent vines which have received no treatment, all the other conditions being the same for both. Whether this distinctly beneficial action of the Bordeaux mixture is due to a decrease in the rate of transpiration of water from the leaves, caused by the presence of the copper salt, or whether the land-plaster, into which the lime of the mixture is in a great measure changed, acts as a fertilizer, is a question which has not yet been settled; but the fact remains as not the least of the advantages obtained by the use of Bordeaux mixture as a fungicide.

Among the many fungicides which are used as powders or vapors, sulphur or mixtures the basis of which is sulphur easily head the list. Even for out-door work powdered sulphur is often an invaluable fungicide, as, for example, in treating the leaf-blight of celery, when no other fungicide seems to be quite as effective. Experience has taught us to apply the sulphur to the plants on a dry day in full sunshine, though it is difficult to say why the treat-

ment is more effective under these conditions. It has been supposed that the fungicidal action of sulphur was due to the evolution at ordinary temperatures of the poisonous gas known as di-oxide of sulphur, but we now know that this gas is given off by sulphur only at very high temperatures. We must, therefore, content ourselves for the present with the simple facts and wait for the explanation of those facts.

In greenhouse work sulphur-vapor has long been an accepted fungicide. Mixed to a paint with oil, and applied to the heating-pipes, it exercises a mild but constant preventive action upon fungous growth. If the latter is sudden and persistent, sulphur, or a mixture of linseed oil and sulphur, allowed to boil without taking fire, in shallow iron dishes, for five or ten minutes, will speedily rid the plants of all forms of "mildew." In the case of the "rusts," particularly of carnations, and of the various leaf diseases to which violets are so frequently subject, the bleaching action of sulphur renders its use inadvisable, nor in such cases does it seem to have much effect. The destruction of the parts affected, thorough drainage, and the use of some liquid fungicide, will give decidedly better results.

One word in closing, regarding the proper method of applying liquid fungicides. It is almost needless to say that a watering-pot, rose-nozzle, or whisk broom, are entirely inadequate to the purpose. The liquid is distributed unevenly; in one place the fungus escapes entirely, in another the leaves are burned by the excessive amount of the fungicide; and, furthermore, such rough methods are wasteful of the material and hence not economical.

The only proper means of applying liquid fungicides are nozzles made for the purpose. Many different forms of spraying-nozzles have been devised, but perhaps the most generally useful is that known as the *Vermorel*, which delivers a copious mist-like spray adapted to coat every leaf evenly with a thin film of the fungicide. This nozzle is now prominent on the market at about $1.25 apiece.

To maintain a constant spray and to deliver it with sufficient force, a force-pump of some kind is necessary. For all greenhouse work, or for work out of doors on a small scale, such as vineyards of an acre, potato fields not exceeding two or three acres, and gardens, some form of knapsack sprayer to be carried upon the back and shoulders is invaluable. A very admirable one is of the Galloway pattern; it consists of a copper receptacle fitted with a small force-pump, and holding four or five gallons. This

is now made by many manufacturers of pumps and pumping apparatus and is advertised by Messrs. W. & B. Douglas, of Middletown, Conn., at about $11.00.

For work on a larger scale, as in orchards or in potato fields of five acres or more, the best apparatus consists of a cask or barrel mounted on a two-wheeled vehicle and provided with a powerful force-pump capable of throwing the spray to the tops of orchard trees. Such pumps are usually fitted for two discharge pipes, allowing of the simultaneous spraying of two orchard rows. If these pipes are of sufficient length and are attached to long poles there is no difficulty in applying the fungicide to every part of the tree. For the application of Bordeaux mixture to potatoes on a large scale, an apparatus was devised at the Connecticut Station last year, which gave complete satisfaction. By its means two men can treat ten acres a day, spraying four rows simultaneously at the average walking speed of a horse. This apparatus will be fully described in the forthcoming report of the Connecticut Station.

Of course the initial expense of spraying apparatus is considerable, and the cost of materials and labor counts for something; but when we consider that a properly constructed knapsack sprayer or brass force-pump will last for years; that by the use of fungicides we can harvest a crop of apples, ninety per cent of which will be clean and free from "scab" and other diseases; that our grapes may be absolutely protected from "black-rot," and that the yield from sprayed potatoes may equal 322 bushels per acre as compared with 102 bushels per acre from untreated vines attacked by mildew, the initial outlay and the subsequent cost of applying fungicides cannot but seem inconsiderable. In these days of scientific agriculture and sharp competition, we cannot afford to neglect any means which tend to increase profits, and among the many means to this end I know of none more important than the judicious use of hygienic and fungicidal methods, by which the danger of fungous disease may be reduced to a minimum.

I fear that I have defeated my own ends by wearying you with a multiplicity of details. If however, you take away with you some conception of the broad and general facts regarding the nature of parasitic fungi, and the means which long study and numberless failures as well as successes have placed at our disposal in combatting their attacks, I shall be more than satisfied.

Discussion.

In reply to a question, Dr. Sturgis said that it was of great importance that all fallen fruit, leaves, and other débris, should be gathered up carefully and destroyed by fire, as all such collections are almost sure to be stocked with spores of destructive fungi, which if allowed to remain, would early in the following spring be distributed by the winds, thus almost insuring the destruction of a heavy percentage of the fruit that might set for that season's crop. Even the most careful spraying of trees does not insure the extinction of these germs.

Dr. Sturgis replied to another question, that the Wild Cherry trees have been a fruitful source from which has come the black-knot fungus, so destructive of our cultivated plum and cherry trees. He believed that as a preventive measure, all wild cherry trees which show any evidence of the disease should be destroyed.

Dr. Sturgis stated to another questioner, that the cracking by frost of sap vessels in some hard-wooded trees, sometimes caused an abnormal growth, closely resembling the black-knot of plum trees, but that it was quite distinct from that disease in character.

Apple-leaf rust *(Rœstelia pirata)* is a fungus produced from spores, which have their origin in what are called Cedar-apples. This latter was long considered a natural product of the Red Cedar *(Juniperus Virginiana)*, but investigation proved that it was a fungus and had been named *Gymnosporangium macropus*. Still later it was found to be only another form, or another stage of growth of the same fungus as the Apple-rust *(Rœstelia pirata)*, and that the spores of neither could be developed, except upon the plant which produces the other form. Dr. Sturgis illustrated this by a case where an orchard was protected from wind by red cedar trees. The fruit trees nearest the cedars were a mass of leaf-rust every season, and the disease diminished as the distance between the cedars and fruit trees increased. In that case he recommended that the cedars be cut off from a belt one-fourth of a mile wide, believing that would prove an effectual remedy; but where the wind had full sway it would carry these red cedar fungus-sporidia for miles, and then they would be as destructive as at nearer points.

Whenever the foliage of sprayed trees is thereby injured it shows that the mixture is too strong and needs further dilution

with water until no harm follows its use. These spraying compounds are beneficial, not only to the leaves of trees and plants, but also to the fruit. Paris green added to Bordeaux mixture, in the proportion of one pound of the former to one hundred gallons of the latter, will destroy the codling moth *(Carpocapsa pomonella)*. For this purpose, spraying with Bordeaux mixture and Paris Green should be commenced early, and the Bordeaux mixture alone can be safely continued to within one month of the picking season. Spraying with ammoniacal solution of copper carbonate may then be kept up to within two or three weeks of gathering the fruit. Paris Green cannot be safely used with the latter fungicide, since the arsenite is soluble in ammonia and will burn the leaves.

Speaking of the popular dread of being poisoned by eating fruit from trees or vines that have been sprayed with Bordeaux mixture, Dr. Sturgis said that one would have to eat six tons of grapes — stems included — to get an effective dose of the copper salt. If, owing to excessive or too late applications of Bordeaux mixture, the fruit shows traces of the fungicide at the time of harvest it may be cleaned by dipping it into a weak solution of acetic acid or vinegar. A better way, however, is to use the ammonia solution in place of the Bordeaux mixture for the last two applications. This dread of being poisoned by American fruit was during several years quite prevalent in Great Britain, and on one occasion, when a shipment of apples which were packed in second-hand flour barrels, arrived, the flour remaining in the barrels was, at first, believed to be white arsenic from American spraying mixtures.

A vote of thanks to Dr. Sturgis for his admirable lecture was unanimously passed.

In his acknowledgment of this vote Dr. Sturgis said he considered it a great honor to be called to deliver a lecture before the Massachusetts Horticultural Society.

The announcement for the next Saturday was a paper upon "Pruning," by Edwin Hoyt, of New Canaan, Conn.

MEETING FOR DISCUSSION.

SATURDAY, January 20, 1894.

A Meeting for Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair. The following paper was read by the author:

PRUNING.

By EDWIN HOYT, New Canaan, Conn.

How shall I trim these trees? is a question often asked by customers who come to the nursery for trees. It is very seldom that a customer knows just how and where to prune, important yet simple as it is. We notice as we ride through the country that a large part of the young trees set out are planted just as they were received from the nursery — not a branch cut and in all probability not a jammed or broken root trimmed. Now I will not say that trees thus set out will not grow, for many of them do, but I do say that from this cause very many of them die, and a large proportion of those which do live make a feeble growth, and, unless the season is very favorable, will succumb to the elements and die in a few years, or prove very unsatisfactory to the planter. It is surprising, however, to see how much vital force there is in a well-grown tree, and how every particle of that force will be used to sustain the tree when taken up and reset.

Nature is true to herself, but her laws cannot be violated without loss in some way. It is, therefore, necessary to study and assist her when we can. If her laws are properly obeyed and assistance added she will never be found lacking. It is almost impossible to remove a nursery tree and reset it so as to keep a perfect balance between the roots and top. When a tree is removed we must study how to assist Nature in her work of restoring the equilibrium lost by taking up the tree and resetting it into other soil.

This can be done by judicious cutting of the top to meet the loss of root, by cutting all broken or spade-cut roots smoothly, thus assisting Nature in callousing the roots, and also by putting proper plant-food where the roots as they start out can readily appropriate it to make new growth. It is wonderful to see how luxuriantly Nature will respond, in all vegetable life when proper

nourishment, care, and attention are given her. Nature never allows man to be her debtor. Whatever he does for her intelligently, she is sure to pay him back again with large interest. Yet how thoughtless, how blind we are, not to study her laws more closely, and follow them more strictly. There are millions of trees sold and planted every year which die, or if they live, never amount to anything, simply because those setting them out do not study Nature's laws and treat trees intelligently.

This can be seen anywhere you go, and you will hear a large number of farmers today denouncing fruit as an unprofitable crop to raise. Now this no doubt is true from their practice and experience, but it is all wrong and need not be so. The innocent, neglected, and abused tree is all right and should not be condemned or rejected as unprofitable because of man's ignorance, laziness, or shiftlessness and, I might add, because of his sinfulness in being so careless with the good things given us by an all-wise Creator, who gave us the trees with their many kinds of fruits, who causes the various kinds of trees all standing in the same kind of soil, all fertilized alike, one to bear an apple, one a pear, one a cherry, one a peach, and so on; who caused the apples, some to ripen in summer, others to ripen in the fall, and still others throughout the winter and spring; some to be sweet, others to be sour; some to be yellow, some green, others striped and red, so that all tastes and fancies can be pleased; who causes the spring-time to come with its green verdure and beautiful and fragrant blossoms; the seed-time and later the summer and autumn, with their fruits and harvest. Surely God is all love and all goodness unto man.

Are we guiltless if we always take from the tree and return to it little or nothing? Has man nothing to do, that he may receive and enjoy these luscious and health-giving fruits? Should he merely set the roots of a tree into the soil and then leave it to combat with starvation and neglect, as thousands of trees throughout New England are left to do? Ride through the country and notice the many orchards standing, sod-bound and in wet undrained soil perhaps, with all that can be grown from the soil in the way of hay and pasture taken off and not a penny-worth of fertilizer added to it for the trees. Not a dead limb cut out, to say nothing of those chafing or growing crosswise, not an insect destroyed; and the poor tree—how it is trying to do its best while

the owner, who has neglected every essential thing on his part for successful results, exclaims, "It don't pay to raise fruit." I knew a farmer who ploughed his field for corn and planted it, but who never cultivated, ploughed, or hoed it. He had no corn. Did he deserve any? He said it did not pay to raise corn. I knew another farmer who prepared his ground nicely for corn, planted and cared for it intelligently, and received upwards of a hundred bushels of shelled corn per acre. He was amply paid for his care and expense. He said it paid him.

Happily there are some who plant out trees intelligently, feed them bountifully, trim and care for them thoughtfully and prudently, and receive from them in return most profitable crops, as quantities of pear and other trees about Boston and some other places demonstrate.

I give a few examples: An orchard of ninety trees in New Canaan produced 206 barrels of picked apples the eighth season after planting. A tree upon our farm, fifteen years old, yielded 12 barrels of choice picked apples. Frank Olmstead, of Cheshire, Ontario County, N. Y., sold from his orchard of one and one-half acres the year before last 379 barrels of apples at $2.40 per barrel, and from the same orchard he had between 300 and 400 bushels of paring and cider apples. A tree standing in Glastonbury, Conn., a year ago produced 95 bushels of apples. Hale Brothers of Connecticut, three years ago sold about $24,000 worth of peaches from their orchard of thirty-five acres. I saw a few years ago exhibited in this hall a bushel or more of Clapp's Favorite pears, every one of which was perfect in form and color, showing great care and skill in the management of the trees and in the handling of the fruit. The exhibit made a lasting impression upon my mind, and I hardly sell a Clapp's Favorite tree without that basket of perfect and beautiful pears standing as a picture before me.

From the above examples, where proper feed, care, and attention have been given to the trees, we are justified in saying that fruit raising may be conducted, not only to great profit, but also with great pleasure, when intelligently done. The day has gone by for slipshod, hap-hazard farming or fruit-raising. We are living in an age of thorough investigation and scientific research. Never was the mind of man more intensely absorbed in experiments and research in the various departments of agriculture and horticulture than at the present day. Agricultural experiment

stations are established in every State in the Union. Experiments, analyses, and tests of fruits and plants are made, and the results are published in bulletins and sent free all over the country. We come together in our State Board of Agriculture meetings, in our horticultural meetings, and our Farmers' Institute meetings, to hear statements of and to discuss the different methods practised; to give our experience and observations on some question relating to our work, wherein we are most interested, and another will give his experience upon that branch in which he is most interested, and so on until the time allotted for the meeting is all occupied. By these methods a large amount of thought and valuable information is brought together. Then the press is on hand to gather up the valuable and interesting points, and through that medium thousands are reached who cannot attend the meetings. So that there is but little excuse at the present day for any who are interested in agriculture or horticulture to "go it blind."

My life work has been, and is now, the growing and handling of trees, and while there is much I do not know about it yet, still there are some things which my experience and observation have taught me. I am here to show you by some object lessons how we trim and treat trees and plants when taken from the nursery to be transplanted into their new homes, where it is so important for their future success that all the conditions shall be made as favorable as possible for them.

The first preparing of the tree for setting and its proper planting, although very important, is not by any means all that is necessary. Start the tree thriftily and in good shape; then feed it liberally, cultivate it thoroughly, prune it properly, watch for and destroy insects and mildew, and for faithful and intelligent work God will reward you bountifully.

Mr. Hoyt brought with him trees, shrubs, and vines, of several varieties each, and representing various conditions. After delivering the foregoing preliminary remarks, he proceeded to illustrate his ideas of the right pruning necessary to produce the best results, explaining the theory at every step, as follows:

For pruning I like a knife much better than shears; the latter are apt to bruise the bark, which should be avoided if possible.

Here is a two years old apple tree. I have seen such a tree planted with not a limb cut off, nor even shortened in; I have also

seen them pruned to a bare stem. The sap always goes to the highest point, therefore the last bud will make the strongest shoot and the tree should branch evenly. This tree shows that it was not properly pruned in the nursery, as here is a branch growing towards the centre, and the central shoot is growing a little to one side. It is the Early Harvest variety, which has a natural tendency to "huddle up" its top.

People often complain that there is too little root to young trees received from nurserymen. Long roots are unnecessary in cultivation; more small roots and fibrous roots are far preferable. In removing long roots or bruised or spade-cut roots, always cut from the under side. When planting or resetting a tree, fill in the earth around the roots carefully and firmly; fingers are the best tools for this purpose. After the roots are covered put on fertilizer — not coarse manure, but a mixture composed of eight parts of bone phosphate, eight parts of muriate of potash and four parts of nitrate of soda. The large roots do not feed the tree, but the feeders are produced from these large roots. There is sap enough stored up in a healthy young tree to last until feeding roots are developed anew. Bone-dust is not all soluble, but in time the tree will absorb the most of it. Do not put in too much fertilizer at the planting, nor at any one time; it is not economy to put plant-food into the soil for a tree to use two or three years hence; it is better to give some each year.

An unshapely tree shows its defects conspicuously. Horizontal limbs should be so pruned as to have the last bud left on the upper or top side, that its future growth shall be upward; and the other limbs are to be pruned to grow in desired directions. This tree, as I have pruned it, will in a few years have a well-balanced top.

Here is a Bartlett pear tree; it is well shaped but the limbs are too long; the roots, running directly downward, are no better for so much length; cut them off several inches in proportion to their length. A tree should be two years old when planted out. Always leave the strongest and most upright shoot for the centre. When there are two shoots of nearly equal size, cut the one nearest to straight over the centre of the plant longer, to form the new leader. Cut the other not over six inches long, leaving the last bud upon it on the outside, to throw the new shoot farther off and out.

These two peach trees are of the same age, were grown in the same soil, and received the same treatment; but one, as you see, is three times as heavy as the other; the difference, you notice, is mainly in diameter. I think, however, that the sap vessels in the heavier one are larger, for which reason it is more liable to injury during winter. I believe that in three year's time the smaller one will overtake the larger in both size and value.

Here is a peach tree from which the lower limbs have been pruned off, leaving only the branches at the top. If the top is left as it is, the tree will feel the wind too much, and doubtless will be twisted and broken by it. Will it do to trim this peach tree like an apple tree? It is better to cut off the top and all the side branches, leaving only a bare stem two and one-half to three feet high.

In resetting peach trees, set them no deeper than they were in the nursery, for if you do you will get the feeding roots below the best soil. The roots, if left undisturbed by the plow, will come very near the surface. If mulch is placed about the tree and left for a year or two, the roots will be found right at the surface of the soil when the mulch is removed.

Fall planted peach trees should not be pruned until the following March. I find that four branches are as many as are needed the second year; they will grow from two to three feet, and of this I should cut off one-half the next spring. There is too much cut wood surface exposed if pruned in the fall, and the drying winds of winter will season these cut ends and kill the nearest bud in most cases.

Here is a quince tree two years old. These little limbs you see upon the trunk are of no account, therefore I prune them off and cut back the four largest to form a new top.

These Sugar Maples are four years old, but are as they were grown in the nursery. Two years ago they were headed back in the nursery, but not moved. They now have more limbs than are needed to make a proper head when reset; some must be cut out and others shortened in. If shaped and started aright now, and the treatment continued for two or three years, they will never need any more pruning.

Here is another maple that was not pruned or shortened in, in the nursery, as it should have been. Now I have pruned it as it should be, to make a good top. It is seldom the best way to

prune off all the limbs, leaving a bare stem two inches in diameter, as trees taken from the woods are usually treated. Trees of the size and proportions here shown (if nursery grown) are much better shaped, and make handsomer and in all ways more satisfactory trees.

The Carolina Poplar is a tree of very rapid growth. Some persons would plant it without pruning; but that would be a mistake. When trained for lawns the limbs should be shortened in, to thicken their tops, and also to increase their ability to withstand the force of the wind without breaking. If for street trees, they should be pruned up higher.

The California Privet is a quick-growing hedge plant. These were grown from cuttings. They should be set deeply, and cut back fully one-half. Some planters set them without pruning; but they are very rapid growers, and I recommend pruning them not only in March but also in July, cutting off fully one-half of the new growth, and sometimes more, else they will soon lose all symmetry as a hedge.

Here we have a Green Mountain grape vine, three years old. All that is wanted from it the first year is one shoot. Let it grow upright and train it to a stake. If properly fed it will grow from six to twelve feet during the season. November is the best time to prune grape vines, therefore during that month cut down the vine to the lowest wire, which should be two and one-half feet from the ground. The second season allow three shoots to grow from the main stem, and in November cut them back to two feet. In the following spring tie down two of these shoots to the lowest wire, for the lower arms; and the third shoot tie to the second wire, which should be eighteen inches above the lowest wire. Each of the lower arms, grown the preceding year, will produce from two to four bunches of grapes from each eye. Most persons allow too much fruit to remain on the young vine, thus weakening the plant and getting a poorer quality of fruit. It is better to leave only one bunch to a lateral to mature in the first two or three bearing years, and never more than three bunches each when the vine is older. The new laterals of the third season's growth should be cut back to two eyes, excepting the end laterals which may be cut back to twenty inches, and tied down to extend the lower arms. Two of the three new shoots of this third season's growth are cut back to eighteen inches, for new arms for the

second wire, while the main shoot extends to the third wire. The succeeding year grow two new arms for the upper wire; extend the lower arms by their end laterals, and prune as directed for the third year. Thereafter the strength of the plant is expected to be given to the production of fruit, and the laterals are to be pruned accordingly.

When the Black Cap raspberry is to be planted, cut off the cane to an eye near the crown of the roots; set the root at least two inches below the general level of the ground, but if set too deep, the sprouts are liable to damp off and die.

If the common Red raspberry is lifted and reset, the removal exhausts the plants so much that no fruit will be produced that year. The fruit is borne upon canes of the preceding year's growth, therefore do not expect any fruit the first year, however thrifty the plant may be, but cut the plant off, leaving it only from six to ten inches long. In the second year it will be best to cut back the new canes to three or four feet. It is injurious to leave the whole length of the canes on at the time of transplanting. It is also best to prune out the old canes that have fruited, as soon as the fruit is all gathered.

Budded Roses should be planted deep, so that the earth covering may be three or four inches deep over the base of the branches, and after the planting is completed the tops should be cut off, leaving not more than three or four inches of wood above the ground. The roses come from the new growth. The annual pruning should be done at the end of March, leaving only a few inches of the last season's growth on each branch to flower the following summer.

Clematises, when planted, should be cut down to within a few inches of the ground; then the succeeding year's growth will be six, eight, or ten feet, according to the strength of the root, and the favorable character of the location. In setting the plant there should be a mound of good soil in the centre of the bottom of the hole, and the mass of roots should be opened well and spread over this mound, and soil worked into and among them, so that each root will be surrounded by fine soil.

Here is a currant bush two years old. Some persons train them in tree form, but it is never satisfactory unless special care be taken to train and protect it. The bush form is its natural one, and thus grown it may be renewed by right pruning. Currant

bushes generally need pruning for two or three years after being planted, especially if the soil is rich and the growth strong. Pruning should be done in March, before the sap starts after the winter rest; but if the frost is out of the ground earlier, the pruning should be done earlier. When branches get old they should be cut out and new shoots be allowed to grow. Currants like plenty of food, therefore manure the plants well.

Discussion.

Mr. Hoyt replied to a question upon clearing trees of dead and useless wood during the fall and winter months, that it could be done, so far as dead wood extended, but if living wood is cut too early, the stub is apt to die down, making it necessary to cut again just before the growing season opens.

The next question was: Should young trees always be staked when transplanted? Mr. Hoyt said that while it is better to stake them, it is not always necessary to do so.

Is it best to pinch the tops of raspberries when three or four feet high, or let them grow as they will, and prune in the spring? Mr. Hoyt thought it best to let the plants grow and prune off the tops to three or four feet in March. He said the pinching caused laterals to start out below the point of pinching, and these laterals being of late growth were tender and apt to be injured by the frost of winter, therefore it is better to let the buds remain dormant through the summer. When cut back in March the buds will then come out strong, and develop healthy fruit stems. The fruit is produced on this new spring growth. He would advise those having raspberries or blackberries to experiment on a few plants and note the results.

The relative earliness of fruit production, from scions set in the limbs of trees or in the stump or roots, being asked about, Mr. Hoyt said fruit would come sooner from a top-grafted tree, unless a mass of suckers started up around its base, in which case the tree should be thrown away. He had known trees two years old when taken from the nursery, to bear a half-bushel of apples the fourth summer after transplanting into the orchard.

The pruning needed after a young orchard is established would be simple. Never allow a limb to grow cross-wise of the tree; prune so as to cause branches to grow outward, and cut out all suckers as soon as they appear. That is about all there is to it.

How to prune aright a top-heavy Bartlett pear tree, was asked. Mr. Hoyt replied that it should be headed down sufficiently to restore the true proportion of all parts. This would tend to increase the relative strength of the trunk, and the upper growth should be kept within due proportion by judicious pruning in March. It is a natural trait of the Bartlett and also the Clapp's Favorite to run up tall.

When should one prune a neglected orchard? was the next question. Mr. Hoyt would take hold of it a short time before the trees started into growth in the spring, and would wish to complete it in one season. Summer pruning tends to check growth, and is, as a rule, unadvisable, unless limited to pinching off the top of an extra strong shoot. This may be practised on grape vines by pinching off the ends of laterals, after the third leaf from the last fruiting joint. Pruning when the tree is dormant, but near the time for spring buds to start, induces growth, which is always gratifying to the producer of plants of all kinds.

Mr. Hoyt was asked to state the facts as to non-success of attempts to graft certain apple trees, with certain other varieties. He answered that some varieties of crab apple trees cannot be successfully grafted with our eating apples. They are unsuited for stocks upon which to graft other varieties. He mentioned the Transcendent, the Marengo, and some others as conspicuous for this trait.

The best method of enriching land for raising trees was brought up. Mr. Hoyt said there was nothing like nitrate of soda and potash to bring out a healthy growth. The former is very soluble, and will be easily dissolved by the first long rain. For that reason the mixture should be applied in moderate quantity — say four hundred pounds per acre—at each application.

His opinion of cutting out fibrous roots was asked, and he replied that he did not know that any harm would come from leaving them on. If the tree had not been dug up these roots would have remained and done their work.

The expediency of growing annual crops in orchards was the next point inquired about. Mr. Hoyt answered that a crop of either oats or rye seems to be poisonous to a young orchard; wheat is not so bad in its effects. But strawberries and other low, hoed crops might be cultivated for a time in a young orchard. The only advantage gained by using manure instead of fertilizer,

is to make the soil lighter, and to cause moisture to be absorbed more readily, and retained better. But the soil of an orchard should be fertile or be made so by the application of a suitable fertilizer—one that is readily soluble so as to feed the crop the first year. For fruit-bearing trees, the fertilizer should have a larger proportion of potash than for other crops. He recommended the following proportions: four hundred pounds nitrate of soda, eight hundred pounds muriate of potash, and eight hundred pounds of bone phosphate, thoroughly mixed and spread under and around the trees on each acre, every year, for if your orchard gives you a crop of apples, you are in debt to it. It is natural for a tree to bear fruit, and to make it bear a crop every year it is necessary not only to thin the fruit early each season to prevent over-bearing, but also to feed it as above every year. Under such treatment even the Baldwin apple is now made to bear a crop of fruit every year. One annual bearing Baldwin tree stands where street wash regularly runs over the ground.

In relation to planting apple and peach trees in the same orchard, Mr. Hoyt said that he would not advise it, as the apple will bear a richer soil than the more tender peach, and the latter does better apart from the other. The peach has lived and been fruitful fifty years in past times, and the speaker believed it would do this again sooner or later.

Mr. Hoyt being requested to advise as to the best selection of phosphates replied that, other things being equal, the only point to settle is, which is the cheapest.

How to deal with borers, he said, was a question that permitted but one answer. Eternal vigilance is absolutely necessary. Watch the trees every year, and twice a year, and exterminate the pest on discovery of its presence.

For the black-wart, after cutting out all affected wood, apply to the cut surface — but not on the bark — kerosene emulsion, or cover with salt and bind it on.

The proper time to plant forest trees, and apple and peach trees, depends on circumstances. First, there is a great difference in soils; where the soil is damp, or more moist than that word implies, he would not set any trees in the fall. He would not recommend setting peach trees anywhere in the fall. Besides peaches, the quince and plum should always be set in the spring, for if set in the fall they will have to resist at once both the shock

of removal and the effect of winter. Nurserymen transplant in the fall in order to save time in the spring, when trade is most active; but they are also familiar with the habits of trees, and aim to supply favorable circumstances as far as possible, to offset those that are unfavorable.

Apple trees should bear half a bushel of fruit on the fourth year from setting in the orchard. The eighth year from setting, an orchard at New Canaan bore two barrels of apples per tree. Experience has proved that it is feeding and care that produces apples.

Mr. Hoyt advised all amateurs to let cherry grafting alone. When it is to be tried it should be done just as the frost is coming out of the ground, and for other fruits before the new leaves are out too far on the trees so treated. Yet apples can be grafted up to June.

It would be far better to cultivate the whole area of an orchard, than a circle around each tree. If you wish to improve the product of a tree by grafting or by more judicious and thorough culture, always bear in mind the fact, that by no treatment, however excellent, can you make a young tree out of an old one.

A vote of thanks to Mr. Hoyt for his very interesting, instructive, and practical lecture, was unanimously passed.

The announcement for the next Saturday was a paper upon "Hardy Grapes," by Dr. Jabez Fisher of Fitchburg.

MEETING FOR DISCUSSION.

SATURDAY, January 27, 1894.

A Meeting for Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The following paper was read by the author:

HARDY GRAPES.

By JABEZ FISHER, M. D., Fitchburg.

It is now forty years since I made my first purchase of grape vines, which included one vine of the Concord, then for the first time offered for sale. Two years later, having in the meantime

seen and tasted the fruit, I obtained six more, and in a moderate way propagated from them. A few grapes from these vines whetted my appetite, until in 1860 a crop of five hundred pounds was despoiled of its foliage by a freezing temperature on three successive nights, the 28th, 29th, and 30th of September. The only use made of the fruit went to show that a grape not good enough to be eatable was unfit to turn into merchantable vinegar.

Notwithstanding this unfortunate result my enthusiasm urged me on and I continued to increase the Concord and at the same time purchased such other varieties as oily tongued agents praised. My first stimulating success came in 1865. In the spring of 1864 I had three-fourths of an acre of Concord vines just in condition to make a strong growth of wood for fruitage the next year, and which everything seemed to favor throughout the season. The spring of 1865 opened very early. The weather conditions were propitious all through, dryness and warmth prevailing, with no untoward influences. The crop was enormous and well ripened. Four and one-half tons grew upon this area, which sold for a uniform price of twenty-two cents per pound, net, the terms being my own. It seemed as if I had struck a bonanza. Many people came to see the fruit while on the vines, and were mostly inspired to go and do likewise. I have never heard, however, that any one of them succeeded in approaching very near such a result, and I certainly have never been able to equal it. The following four years were passed while vainly waiting for a repetition, and it was not until the fifth that a satisfactory product rewarded my efforts, although in the meantime small crops and large prices were the rule.

In 1871 a very fine crop was promised, but out of a product of five and three-fourths tons, I sent to market only one and one-fourth tons. The season of growth and maturity was apparently favorable and the frost held off until October 21st, but the larger part of the fruit was unsalable, even in those days of high prices and slight competition. I then appreciated for the first time that a grape vine left to its own resources would set and carry more fruit than it was possible for it to mature, and as a consequence the quality would be so far depreciated that much of it might be worthless. That lesson, which cost me a high price, I have never forgotten, and if I have erred since it has been in the opposite direction of too severe thinning. Since 1871 large crops have

generally, though not always, alternated with small ones, but through judicious thinning the quality has been satisfactory considering the variable seasons. In the whole of my experience there have been three total failures. The entire destruction of the foliage before ripeness, previously mentioned, in 1860, was followed in the years 1875 and 1888 by seasons so cool and uncongenial that, although the fruit had all the outward appearance of perfect maturity, it contained so little sugar as compared with the accompanying acid, that not a berry was fit for sale except for cooking purposes. This was through no fault of mine, and therefore no apology is called for.

In consequence of the enormous extension of the industry, the prices brought in market have constantly tended downward, from twenty-five cents per pound, net, in 1866, the highest which I obtained, until tons were sold in 1893, at a fraction of over one cent, from which freight and commission were to be deducted. I do not mean to say that any of mine were sold at these lowest figures, but the markets have been abundantly supplied with fairly eatable fruit at extremely low prices. This condition of affairs is due to two things. One is an unusually large product, and the other is the effect of what is variously called a panic, a business depression, or a want of business confidence, that resulted in depriving multitudes of people of the power of purchasing even so cheap a luxury. It is a strange and lamentable state of things, when the very abundance of earth's products must lie and rot and waste, while thousands who would gladly utilize and enjoy it cannot, in consequence of enforced economy through compulsory idleness.

In view of the present situation, what is the outlook for the future? Is it expedient for a person in this State to set a vineyard, large or small, in the expectation of deriving from it such an income as would be fairly remunerative as compared with other crops or businesses? I know of several cases where the owners have taken out and destroyed their vines within two years, and of others who are contemplating such action. I hardly feel like advising such a move, and yet it depends upon circumstances. It is evident that there can be no profit in growing grapes in this region, for market, where the net prices obtained do not reach at least two cents per pound. There have been many tons sent to market that did not realize that and yet brought all that they were

worth. Neither should I advise a novice to start in the business. If, however, a person has a vineyard well situated and in good condition, I think it wise to attempt the growing of the best possible quality of product. Prices for 1894 are likely to be better than the last season. The quantity grown will probably be less, and the anticipated improvement in business together with this hope gives us the right to assume that prices will be better.

To attain the quality that commands the highest price calls really for only a few conditions, but they are imperative, and are as important to the amateur with his few vines as to the extensive cultivator. What I have to say in a brief way in this regard will apply equally to both classes.

My own experience, coupled with observation, has taught me that the best soil, where there is a choice, is a strong one inclining to clay, but not too heavy, and it must be well drained, either naturally or artificially. A gentle southern or southeastern slope, near to but not on the summit of elevated land is desirable. Shelter of land, trees, or buildings is useful. No especial preparation of the soil is necessary. A field in fit condition for corn is also suitable for grape vines. Two years old plants may be the best but usually are not. Unless they have been transplanted at one year and the roots shortened in, I should choose one year olds. Spring is the preferable season for planting, and the earlier the better, providing the soil is friable. Cultivation should take place as soon after every packing rain as the surface will work mellow. No training is necessary the first year. As soon as the leaves fall the vine should be cut to the ground, leaving two or three buds only. The second year a temporary stake should be used to support the growing vine, which needs no other training, and no pruning except that a single cane only is allowed to grow. The autumn pruning is like that of the first year, two or three buds only being left upon the vine.

At the commencement of the third season a permanent support should be provided according to the system of training that is to be adopted, whether trellis, stakes, or otherwise. The object in view during the season is to grow a single, strong cane for fruitage the subsequent year. When the length of six feet is reached the end is to be stopped by pinching off the point. All laterals which grow from this cane should be pinched sufficiently close that they may not divert growth from it, but otherwise there should be

full freedom of development. If the growth should be satisfactory, *i. e.* make a strong cane from five to six-sixteenths of an inch in diameter, it will be safe to allow it to fruit for half its length, and it should be cut back to that point at the fall pruning. If less vigorous, the whole should be cut away as in previous years. Nothing so injures a young vine as to allow it to carry a crop of fruit beyond its capacity. It is like putting a three years old colt to do the work of a fully developed horse, or a boy of fifteen or sixteen years to perform a man's labor. I am confident that more failures and discouragements arise out of this mistaken policy than is generally believed.

If the vines are planted six feet apart in the row, the subsequent treatment is to fruit the one cane and grow a new one to replace it the following year, cutting out the one that has borne fruit. If the vines are twelve feet distant, they may be allowed to fruit two arms of six feet each and produce two new canes to replace those fruited. This will require a year or two more to reach full bearing. At the less distance each vine may be allowed to carry as many clusters of fruit as there are spurs growing from the arm, and at the greater distance double this number. These fruiting spurs are to be tied to the trellis if the best results are aimed at, or allowed to swing free, as in the Kniffen system, if the cheap way is preferred.

This is what is known as the renewal system, the vine being, so to say, renewed each year and thus kept perpetually young. As the fruiting wood is cut away at the annual pruning, there is no doubt that the particular roots which have supported it mostly die, while the new, vigorous ones, corresponding to the new cane, remain to carry the crop at the next fruitage; thus in reality only the trunk of the vine is permanent, whatever its age. This mode of treatment insures large clusters, and if the fertility be ample and the fruitage not too heavy, the berries will also be large with a heavy bloom which is at once attractive in market and an evidence of high quality.

If the land is in good heart and no other crops are grown upon it, no fertilization will be required previous to the third year, but otherwise it should be supplied from the commencement.

What is fertility? Chemistry teaches us that all plants obtain the elements which go to make up their structure either from the soil or the atmosphere. The soil furnishes the ash ingredients and

the atmosphere and soil together the gaseous. The ash comes from the disintegration of the particles of soil, to some extent through weathering as it is called, but mainly, I think, from the decomposing action of the roots of plants. Almost any plant growing in a clear glass vessel will so far decompose the glass itself as to corrode or etch the surface, and if sufficient time be given will produce the appearance of ground glass. This action takes place very slowly to be sure, but the millions of soil particles give sufficient surface to the roots, so that the plant obtains enough by which to continue its existence, and if all the elements which it requires be in plentiful supply, the resulting product will approach a maximum. Many of these elements do occur in most soils in sufficient quantities for a full growth and development of most plants, but a few do not. These, named in the order of the relative amounts generally necessary, are Potash, Nitrogen, Phosphoric Acid, Lime, and Magnesia. Hence, to grow profitable crops these substances must be added to the soil in some form so that the plant may obtain enough to satisfy its full needs.

Barnyard manure has always been looked upon as a complete type of fertility. It consists largely of hay with more or less grain, ground fine by the animal that, through digestion, withdraws a small percentage of nutriment from it, and excretes the remainder. If all the liquid and solid matters thus voided are saved they constitute a very complete fertilizer. The solid portion alone, however, is incomplete, or one-sided in composition, as is also the liquid, which is the other sided. Neither one alone can supply the place of the other, nor compensate for its absence. It is found in practice, in the growing of fruits at least, that its place can be supplied with other substances, both with economy and better results. Barnyard manure like all organic substances is available only after its decomposition, which requires two or more years for its completion, and it is a serious economic question if it be best to apply costly materials on which dividends are unnecessarily postponed. Chemistry shows that the more valuable constituents of barnyard manure can be supplied in commercial substances, in better forms, at a cheaper rate and with surer results. The average composition of fruit trees and vines, together with the fruits, as shown by many analyses, led me to believe that for satisfactory results, there should be applied to each acre annually, not less than 100 to 120 pounds of potash, 40

to 50 pounds of nitrogen, the same amount of phosphoric acid, and 9 pounds of magnesia, with some lime. To obtain these substances in the best and cheapest forms, I am using a formula made up as follows:

225 pounds high grade Sulphate of Potash, 100 pounds Sulphate of Ammonia, 200 pounds Nitrate of Soda, 200 pounds South Carolina Floats, 50 pounds Sulphate of Magnesia, 75 pounds Plaster. Total, 850 pounds.

These ingredients are nearly all quite soluble and the vines are able to appropriate them as required through the growing season. They should cost sixteen dollars or more, according to the quantity required or the facilities for obtaining them.

What are the drawbacks? It is not all plain sailing. You may cultivate a vine or two in the garden and with reasonable care expect success, but when you plant an acre you invite insects and diseases, by offering them opportunities for development and increase. Sometimes these enemies interpose very serious obstacles to success. Generally, however, they are easily kept under the control of the wide-awake and persistent cultivator. The steel-blue beetle, *Haltica chalybea*, appears early in the spring, at the time of the swelling of the buds, and does its injury by eating a hole into their sides, which arrests the development of the shoot with its fruit. Hand picking is a perfect and the only efficient remedy. It should be attended to before the injury rather than after. The common rose bug, *Melolontha subspinosa*, makes its appearance just as the vines begin to show bloom, and each one easily consumes the embryo grapes of a cluster at a meal. By holding a small cup partially filled with water, having a little kerosene on its surface, under him and suddenly calling his attention to it, he will, unless the weather is very warm, accept your invitation and drop in to investigate. One person by this means can capture a thousand in a brief time, and an hour or two in the cool of the day will generally be ample to keep them from doing much injury. If they should appear in such numbers as to threaten destruction to the crop, I should put on force enough to keep them down, but, I should at the same time search out their breeding place, which is generally a field of grass near by, and in some way prevent their future multiplication. It does not necessarily follow, however, that the numbers appearing in one season have any very close relation to those that present themselves in the succeeding one.

The diseases of the grape vine are mainly of a fungous character, such as mildew of the foliage and black rot of the berries. Several successive moist seasons, favorable to the spread of these troubles, will sometimes grow to seriously injure the crops and the vines, but as a rule Massachusetts is not a great sufferer thereby. We have an effective remedy in solutions of copper, but they should be applied in such a manner as to prevent rather than cure the disease. It is a case where a stitch in time saves nine. As I before stated, three times in my experience of forty years the seasons were so unpropitious that I failed to realize anything for the crop, as its acid rendered it unsalable. This condition I know no means of preventing.

My experience in growing grapes for the market has been limited to the Concord. Originally I set a number of varieties, and have nearly every year continued to plant a single vine of every new kind that the owners told large stories about, at first trusting, but latterly only hoping, that something better than the Concord might make its appearance. I have not yet seen it. A few varieties earlier or later give me more or less satisfaction for family use, but so far no one that tempts me to plant a duplicate vine. Other growers, differently situated, find partial substitutes, but I am sure that a well grown and thoroughly ripened Concord grape never yet has gone begging for a customer.

There exists in the community a somewhat extensively entertained prejudice against swallowing the seeds of grapes. Many people will not eat this fruit because of the fear of the malady known as *appendicitis*. If they are obliged to crush the pulp to get at and discard the seeds, they find the former so sour as to destroy all the pleasure. This would not be the case if the grapes were first-class and well ripened. Most of you are probably aware that there is in every human being a small appendage to the *cæcum*, the commencement of the large intestine, called the *appendix vermiformis*, which has no known function and apparently no earthly use, except as it gives business to the surgeon when it gets a patient into trouble. This appendage may become inflamed either with or without a foreign body in it. Generally, however, a collection of fecal matter in the form of a soft concretion or stone is the cause of the inflammation. Most cases are so mild as to cure themselves. Occasionally, however, the disease pursues so rapid a course that nothing can prevent an early fatal

termination. At times an abscess results which requires operation. When the concretion ulcerates rapidly through the appendix, or when the abscess breaks into the abdomen, it sets up a peritonitis which proves fatal. The remedy lies in the surgeon's knife which if used in season, by removing the inflamed appendix saves the life and prevents any subsequent recurrence.

In order to ascertain if there exists any connection between the swallowing of grape seeds and this affection, I requested one of the most eminent surgeons of Boston, Dr. Maurice H. Richardson, who has operated many times in these cases, to give me his opinion. He informed me that in all his experience he had never found a grape seed as the cause, but always a little hardened fecal matter. Foreign bodies have been found to some extent, but the rule is as here stated. Dr. Richardson assures me that while he rejected the seeds of grapes for many years he has now given up the custom as an entirely unnecessary and inefficacious precaution in the prevention of *appendicitis*. It might appear from the more frequent notice of deaths in the newspapers of late that this disease is largely on the increase and thus in some way connected with the enormously increased consumption of grapes, but the affection is better diagnosed than formerly, when, without an operation or a post mortem examination, it was set down as inflammation of the bowels or peritonitis.

I have purposely refrained from wearying you with many details of management that would be interesting only to a few, knowing that the discussion which is to follow would bring out such points as might be desired.

As a final word I desire to insist upon and emphasize the two indispensable conditions for the highest success, which also apply to the growing of all the larger tree fruits as well as grapes. One is the necessity of ample, annual fertilization, and the other is the severe thinning, by which quality of product, and consequent high price are to be realized and maintained.

Discussion.

A gentleman in the audience spoke of a grape vine which was infested with a caterpillar through the season. It was of a grayish color, and varied from half an inch to two inches in length. A hundred or more were taken off, with a pair of nippers, every day for several months.

Dr. Fisher said that sometimes a particular insect will breed in a vineyard, and feed upon the vines. The only way to deal with insects is to exterminate them early. Like the flea-beetle (*Haltica chalybea*), so destructive of the grape foliage, the caterpillars mentioned might have been checked in the early part of the season by some spraying mixture. Paris green would undoubtedly have destroyed them if they ate of it.

Richard T. Lombard said that Paris green did not appear to kill the cutworm. He had used Paris green on his carnation plants under glass in such quantity as would kill vegetable-eating insects, yet the cutworm destroyed the foliage with apparent impunity.

A stranger remarked that in Western New York the Worden grape brought better prices than the Concord.

Dr. Fisher said he had had the Worden grape in cultivation for twenty years and had never had it ripen a week earlier than the Concord. Generally it colors only one or two days before the Concord. It has a larger berry, but he considers it a diluted Concord. Like Moore's Early it splits badly with fall rains; it has not the sparkle of the Concord, when both are thoroughly ripe; will not bear transportation as well, and is always a poorer keeper.

The Iona being mentioned, Dr. Fisher said that at Fitchburg the season is not quite long enough for it to ripen. He had got tired waiting for it. It may do well if grown in a favorable corner of a well protected garden.

Samuel Hartwell said that his first experiment in grape culture was to set four hundred one year old vines of Moore's Early. They were planted in a well tilled field, in drills. The next year he reset them in the same field, in vineyard form, eight feet apart in the rows, which were nine feet apart, thus covering one acre, and giving ample space to drive through with a horse and cart. With him, Moore's Early proved a good grape, ripening well every year. It is not so great a bearer as the Concord, but generally sets as much fruit as the vines are able to mature thoroughly. He has not pruned as severely as Dr. Fisher has done. His vines have two arms from three to four feet long each way. The prices received for the fruit have averaged from five to six cents per pound, in Boston market. He received nine hundred dollars in one year, for the fruit and cuttings sold from the first acre.

During the two or three years after they came into bearing, the crops of fruit were larger than they ever produced afterwards. He was generally able to get his grapes into market early, while higher prices ruled; but last year the highest price received was eight cents; the market was soon over stocked and prices went down rapidly. His next planting was a new vineyard of four acres, with Moore's Early; and the same season he planted a three-acre vineyard of so-called white grapes, including one thousand Hayes, the rest of the ground being planted with Pocklington and Niagara. The Pocklington is very showy, and perhaps is the best native white grape. The Niagara drops its berries easily, especially where the ground is depressed and the soil is richer. The Hayes was quite unsatisfactory. Upon the whole the white grapes proved an unprofitable investment. He has taken out the Hayes altogether, and on that ground are planted one thousand vines of the Worden, which he considers a week earlier than the Concord. It is ready to take off as soon as Moore's Early are marketed. A Concord man who has a fondness for grapes, desires to have some Wordens saved for him. He appreciates their peculiar flavor. The fertilizer used by Mr. Hartwell is a mixture of three tons of ground bone, and one ton of muriate of potash. Of this he applies from five to six barrels to the acre. Insects have never troubled him much until last year, when rose bugs were more numerous than ever before. Mr. Hartwell referred to Dr. Fisher's statement, that when a fruited arm or branch is cut away the roots that supported that part died, and said he could not bring himself to believe in that theory; if true in the case of a grape vine, why not in trees? He knew of an elm tree from which all the roots on one side were cut away; yet no one branch of that tree appeared to suffer any more than any others from this great loss.

In reply to a question concerning the storage of grapes, Dr. Fisher said that after being gathered they should be kept in a cool, dry, still atmosphere, at a temperature of about forty degrees. Below that point, if dampness should exist, the fruit will lose its flavor. Thoroughly ripe Concord grapes will not keep long under any treatment. Catawba grapes will keep all winter, if not allowed to become so dry that the stems will shrivel, nor so moist that they will mould.

E. W. Wood doubted whether marketmen would agree with Dr. Fisher in regard to the quality of the Concord grape. He gets his fruit perfectly ripe. As a rule marketmen prefer the Worden grape. Girdling, it is claimed, extends the season two or three weeks, by forcing the ripening process in advance of the usual date. Another advantage gained is that the berries are larger, while chemical analysis shows that the quality is equally good. There is some question as to whether the grapes of finer quality— like the best Rogers Hybrids — may not be ripened earlier, and also gain other advantages, by the girdling process, especially by amateur growers, who in many cases have smaller areas and better protected grounds.

Dr. Fisher said that during a term of three years he made some extended experiments in girdling grape vines. In some cases he girdled one of two fruiting arms. On some vines he girdled both arms. He found that on the average, the grapes on a girdled arm ripened ten days earlier than usual, but the grapes on the other arm ripened later than usual, therefore he lost on the latter about half as much as he gained on the girdled portion. When both principal arms were girdled, whatever grapes were growing upon other and smaller shoots failed to ripen at all. In two or three years' experience, he found that those vines which were subjected to girdling failed to make as good a growth or to ripen their wood as well, and therefore set less fruit, which proved poorer. In fact they required two years to recover from the effects of girdling, and in three years' time he concluded he had gathered less fruit on the whole. Rains falling on nearly ripened girdled grapes caused many of the berries to split open. Moore's Early sets a very light crop; and this, and Worden, and the girdled Concord, are all very liable to split open if rain comes at their ripening season. He was certain that they did not pay him. They might prove a success with others under different circumstances.

Mr. Wood knew of a vineyard at Concord where the girdling system has been practised eleven years, and no difference in the vigor of the vines has been noticeable; they were heavily loaded with large fruit, which last year ripened at the beginning of September. The owner would feel like going out of the business if he could not girdle and gain the advantage thereby secured. Mr. Wood had met with similar expressions of opinion at Worcester, and in various other sections of the State.

Dr. Fisher declared that nothing else in the grape line is so mean as an unripe Concord. No other grape is better than a well-fed, *ripe* Concord. That is the point about which, and to which all he had said was directed. There is a great difference in grapes of the same variety, as they are grown in or near Fitchburg, or are grown in portions of the state of New York. He considers the latter too sweet for most tastes. After eating freely of them, as of confectionery, one needs some cheese to counteract their cloying effect. Respecting the flavor of any fruit, he said that if it is produced upon a vigorous plant the flavor can be greatly improved by thinning out the fruit that sets; then the tree, shrub, vine, or plant, will have to mature only the amount it can carry to perfection. All extra fruit ensures just so much deterioration of quality or flavor. His practice is to thin out each cluster when the berries are about the size of peas. As a rule, from his long experience, he can judge about right as to the extent of the thinning; but sometimes circumstances connected with the weather, insects, fungi, or possibly the fertilizers, may be so peculiar as to make it very difficult to judge aright in this matter of thinning, but with him it is never overdone.

Referring again to the theory of special roots feeding corresponding single branches, and even twigs and leaves, Dr. Fisher said that a full-grown tree, in the absence of any injury or mutilation, will have a root for every limb, a rootlet for every twig, and a multitude of feeders for every part and parcel of the foliage. The annual feeding roots all die each year after performing their functions, as do the leaves; while the larger roots remain permanently, like the limbs and branches above the soil. In the case of the grape vine, a large proportion of which is pruned away each autumn, the roots corresponding to these arms, or branches, also mostly die and decay. If it were otherwise the ground would be filled in a few years, with roots many times greater in bulk than the unpruned portion of the vines remaining, which is never the case. Hence, in girdling, the large root corresponding to the girdled arm does not ripen but dies, and is of no value to the vine afterward. If a large limb of a tree is severed, the root supplying it ceases its functions and decays. Conversely, the cutting-off of a main root deprives the limb, which it specially supplies, of means of growth, and it dies, or becomes much enfeebled thereby. If it does not fully do this, it is only because of a means of com-

pensation which Nature employs, by a very gradual process of supplementary circulation, analogous to that which follows the occlusion of a large artery in the animal body. If the artery is too large, or the operation too sudden, or the surrounding tissues much weakened, the new circulation cannot take place in time to prevent the death of the parts to be supplied with blood, and they necessarily succumb. Cultivators under glass, who suffer from the injuries caused by nematoid worms, may notice the sudden death of leaves or parts of leaves, which results from the supply of sap being cut off, by the work of these worm pests upon the roots.

Dr. Fisher, in answer to a question as to what varieties, and how many of each, should be included in an order for twenty-five grape vines for home use, said he should hardly recommend planting twenty-five varieties. He spoke of the Cottage grape — a seedling of the Concord — as one that is sure to ripen in this latitude. When nearly ripe it is a pretty good fruit, but if left to mature fully, it loses all its acid and becomes worthless. It is a strong grower, and therefore adapted for high training under this treatment; bearing arms even ten feet long can be allowed to fruit when well grown and fully established.

On motion of Leverett M. Chase, a vote of thanks to Dr. Fisher for his valuable lecture was unanimously passed.

The subject of the next Saturday Meeting for Discussion was announced as: "Electricity and Plant Growing," to be introduced by L. H. Bailey, Professor of Horticulture, Cornell University, Ithaca, N. Y.

BUSINESS MEETING.

Saturday, February 3, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

Leverett M. Chase, Chairman of the Committee to procure a portrait of Ex-President William H. Spooner, reported that the Committee had attended to that duty, and asked to be discharged. The report was accepted and the Committee was discharged.

Charles E. Richardson, Treasurer and Superintendent of the Building, read his report for the year 1893, which was accepted and referred to the Committee on Publication.

J. D. W. French offered the following resolutions, which were unanimously passed:

Resolved, That the Massachusetts Horticultural Society approve House Bill (H. R. 119), — A Bill to Protect Public Forest Reservations, — and urge the immediate passage of said Bill.

Resolved, That a copy of these resolutions be sent to the Senators and Representatives of this State, in the United States Congress.

On motion of E. W. Wood, it was voted that the Society offer the use of one of its halls to the American Carnation Society at its Annual Meeting, in 1895.

On motion of Mrs. P. D. Richards, it was voted that the name of the Window Gardening Committee be changed to Committee on School Gardens and Children's Herbariums, and that this Committee be appointed by the Chair. The Chair appointed as that Committee:

Mrs. Henrietta L. T. Wolcott, *Chairman*,

Henry L. Clapp,	Mrs. P. D. Richards,
George E. Davenport,	William E. C. Rich,
George A. Parker,	Miss Katharine W. Huston.

The following named persons, having been recommended by the Executive Committee, were on ballot duly elected Members of the Society:

Clarence E. Grosvenor, of Charlestown,
Mrs. Mary R. Keith, of Wollaston,
John Ash, of Pomfret, Conn.,
Frank C. Bosler, of Carlisle, Penn.,
Herbert S. Carruth, of Dorchester,
Samuel M. Boardman, of Milton.

Philip A. Chase, of Lynn, and John C. Cobb, of Milton, were proposed by Nathaniel T. Kidder, as members of the Society.

Adjourned to Saturday, March 3.

MEETING FOR DISCUSSION.

Electricity and Plant-Growing.

By L. H. Bailey, Professor of Horticulture, Cornell University, Ithaca, N. Y.

Plants depend upon two sets of factors for their life and growth: food, supplied directly by the soil and atmosphere; environmental conditions, as warmth and sunlight. Given these agencies, plants thrive anywhere and at any time. There are certain other circumstances, however, which greatly modify the rate and direction of growth and development, without being essential to the life of the plant. It is these accessory influences and conditions which largely determine the value of cultivation; for amelioration is effected only when man adds some facility which Nature withholds. There is no absolute or fixed standard of the conditions of life, and every change in them, however slight, is reflected in some way in the plant itself. Every plant is different from every other plant because no two of them are subjected to exactly the same conditions of existence. So it happens that every condition which comes under the dominion of man influences plants profoundly, because these conditions are thereby widely diverted from their original scope. The difference between the modification of plants in nature and in cultivation is mostly one of intensity or degree, and not one of kind; for it is only when man practises direct selection that he may adopt what may be called an unnatural or abnormal ideal. Now these accessory circumstances which diversify the vegetable kingdom are chiefly of four kinds:

1. Excess in the primary conditions of life, as an unusual or abnormal supply of food, warmth, or light. This, in one form or another, is the chief means of the variation and consequently of the evolution of plants.

2. Modifications in the periodicity of diurnal and seasonal changes. Plants soon become accustomed to the circumstances in which they live, or fitted into them; and a change in this environment must inaugurate a new set of adaptations. What is called the "rest" of cultivated plants is simply an adaptation to conditions in which the plants once lived. In most parts of the globe there is a season of enforced inactivity, due to cold or dryness; and when plants are taken from these regions into greenhouses

they demand a like period of inactivity. This is particularly true of bulbous plants, and all those which spring from fleshy underground parts; and even with woody greenhouse plants the gardener allows a certain season when the plant is kept in a state of partial inactivity. But this season of "rest" is not a necessary attribute of vegetation, as most gardeners think, but is simply an adaptation, and in many cases it can be wholly overcome through long continued cultivation. Some plants modify themselves more readily than others in this respect, due to differences in the elasticity of their organization. If cultivation often overcomes this period of passivity, and thereby proves it to have no necessary vital function, observation of unmolested floras may show it as well, for there are certain regions in which vegetation never ceases to grow; and, furthermore, the gradation from trees to shrubs and herbs in certain species, or congeneric species, from the south to the north, shows that the duration of a plant may be determined wholly by the seasonal periodicity in which it is placed. This leads me to introduce a phenomenon which is particularly germane to the general subject that I am shortly to bring to your attention — the fact that plants undergo a diurnal variation in function. It is well known that the chief activity of the plant in daytime is directed towards the getting and making of food, or assimilation, while in the nighttime it uses this food in making growth. But this, again, is only an enforced adaptation or division of labor, for, as the plant cannot assimilate in darkness, it devotes the greater part of its energies at that time to the building of tissue, and leaves itself free to "make hay while the sun shines." But both these functions may and often do proceed simultaneously; and in the long days of the Arctic regions plants complete the whole process of growth and fructification in sunlight. If we once disabuse our minds of the common belief that plants must rest at night, we shall be prepared to understand that artificial light in the hours of darkness can work no injury unless it carries with it something beside illumination.

3. Plants are modified by physical manipulation, as training and pruning and the horticultural methods of propagation; and

4. By the application of stimuli. The effects of stimuli upon plants are little known, largely because any circumstance which incites unusually rapid growth is commonly classed as a stimulant. But the term should be applied to those agencies which appear to

exert some exciting influence upon the physiological processes, and not to the action of greater warmth or more food, or to any intensification of the ordinary conditions of existence. I insist upon this distinction here because it enables me to contrast two phenomena which are often confounded in their effects upon plants, but which are in essence far apart: namely, the effect of electric light, which simply adds light to light or, in other words, increases the daytime, and the electric current, or electrification, which in some way disturbs or excites the normal functions.

I. The Application of Electrical Illumination to Plant-Growing. We are now ready to approach the subject of the influence of electrical forces upon vegetation in a philosophical spirit. These forces or agencies are of two general types — the electric light, which is simply a method of illumination, and electric currents, which are a means of electrification. The former of these agencies is the one to which I invite your chief attention. We may feel sure, at the outset, that illumination at night will not injure the plant; and as it has long been proved that artificial lights exert much the same influence upon plants as the sunlight does, only in smaller degree, we shall expect that good results will follow, and in proportion as the energy of the artificial light approaches the energy of solar light. The electric arc light commends itself above other common artificial lights because it is the most powerful. The spectrum of this light is that of carbon, combined, probably, with certain products of combustion. It contains the same parts as the solar spectrum and in approximately the same proportions; but it is richer in the ultra-violet rays and probably somewhat weaker in the orange rays, which accounts for its dazzling blue-whiteness. It is pretty well ascertained that the orange portion of the solar spectrum is particularly promotive of the assimilative power in plants. This fact suggests that the use of an orange globe for the electric light would bring its spectrum nearer to that of sunlight. Our experiments with color-screens show that an amber glass — which is the nearest approach to orange in commercial glass — gave more rapid growth or earlier results than other colors; but it is doubtful whether the assimilative power of the ordinary electric light is sufficient to render minor modifications of the visible portions of its spectrum practically appreciable in plant growth. Incandescent electric illumination has not been carefully studied in its effects upon

plants, although experiments made by one of my former pupils, and yet unpublished, show that it may hasten growth. But the amount of light is much less than in the arc-lamp, as the ordinary incandescent bulbs give from sixteen to fifty candle-power only. But we hope to investigate the subject soon.

If the electric light, therefore, is similar to sunlight in essential effects upon plants, it remains for us to discover two things: 1. Does the light contain injurious properties along with illumination? 2. Are all plants equally susceptible to its influence?

Although Hervé-Mangon had demonstrated in 1861 that the electric light can occasion the production of chlorophyll or green matter in plants, and that it can produce heliotropism or draw plants towards itself, and although Prillieux had shown in 1869 that it is capable of promoting assimilation, it was not until near the close of the seventies that any application of the light to horticultural purposes was attempted. The first horticultural experiment was made in England by Dr. C. W. Siemens, a renowned physicist. Siemens experimented with a variety of forced plants, mostly those which produced edible fruits, as strawberries, tomatoes, grapes, and melons. Upon all these plants the effect of the arc light was marked, sometimes injuriously and sometimes beneficially. Dr. Siemens soon found that a naked or unscreened light was injurious to plants at short range, but that the interposition of a clear glass globe or an ordinary window pane prevented such injury. He demonstrated that the light can be placed above the house with good results, and thereby also showed that the modification of the plants was due to illumination and not to electrification nor to products of combustion. In general, plants were earlier under the screened light than in natural conditions; that is, they grew more rapidly, and this is the result which we should have anticipated, if it is true that the electric light simply lengthens the day. At the close of his experiments, Siemens was very sanguine that the electric light can be profitably employed in horticulture, and he used the term "electro horticulture" to designate this new application of electric energy. He anticipated that in the future "the horticulturist will have the means of making himself practically independent of solar light for producing a high quality of fruit at all seasons of the year." He had shown that growth can be hastened by the addition of electric light to daylight, that injury does not necessarily

follow continuous light throughout the twenty-four hours, that electric light often deepens the green of leaves and the tints of flowers and sometimes intensifies flavors, and that it aids to produce good seeds; and he thought that the addition of the electric light enabled plants to bear a higher temperature in the greenhouses than they otherwise could bear. But whatever may be the value of the electric light to horticulture, the scientific value of Siemens's experiments is still great. They have furnished data in regard to several obscure relations of light to vegetation. "Nature" made the following comments upon this feature of the application of the electric light by Dr. Siemens: "But the scientific interest of its present application must rest mainly on the fact that the cycle of transformation of energy engaged in plant life is now complete, and that, starting from the energy stored up in vegetable fuel, we can run through the changes from heat to electricity, and thence to light, which we now know we can store up in vegetable fuel again." While the experiments were designed for practical purposes, and while the economic results seemed to be important, the most valuable conclusions of these signal investigations are such as concern the purely scientific questions of the interrelations of plants and electrical illumination.

Whilst Siemens was concluding his experiments in England, Dehérain was conducting similar ones in Paris; but while Siemens had attempted only to supplement daylight by electric light for a part or all of the night, the other endeavored to grow plants by the continuous electric light alone, with practically no aid from the sun. He found at once that the naked arc injures plants, even though it promotes assimilation more rapidly than the screened light. Barley in head and flax in flower were brought into the lighted compartment; also chrysanthemums, pelargoniums, roses, and a variety of ornamental plants. After seven days of continuous electric lighting most of the plants were seriously injured. All the pelargoniums lost their leaves, cannas were discolored, four o'clocks were tarnished, and bamboos were blackened. "But the most curious effect was produced upon the lilacs; all the parts of the leaves that had received the direct rays from the lamp were blackened, while those protected by the upper leaves preserved their beautiful green color, and the impression produced upon the epidermis by the electric rays had the clearness of a photographic plate." Similar effects were produced upon azaleas,

deutzias, and chrysanthemums. It was found that this discoloration did not extend beyond the first layer of palisade cells. Plants which received solar light by day and electric light at night only, were injured in the same manner but in a less degree. The injury was most marked upon the old leaves. The pelargoniums soon sent out new shoots and the young leaves resisted the action of the light much longer than did the mature ones. The flax continued to grow and the barley ripened. It was found that plants under the electric light alone were able to assimilate, but the action was very slow. As much assimilation took place in an hour on a bright summer day as in several days of electric light. At the expiration of two weeks the condition of the plants was so bad that a change was made, and thereafter a globe was used upon the lamp. Dehérain also found that while established plants may continue to live and even to grow when exposed only to an electric light, sprouting seeds die before making true leaves. The functional difference between the germinating seed and the independent plant is expressed by the fact that in the former oxygen is freely absorbed and carbonic acid gas is given off, while in the mature plants the reverse is true in the main — carbonic acid gas is freely taken in and oxygen is freely given off; but it is not known whether these processes are concerned in the widely different effects which the light exerts upon these stages of vegetation. I have also observed an injury to follow in exposing very young plants to the arc light, but I cannot account for its cause. Dehérain's general conclusions in regard to the influence of electric light upon plants are as follows:

"1. The electric light from lamps contains rays harmful to vegetation.

2. The greater part of the injurious rays are modified by a transparent glass.

3. The electric light contains enough rays to maintain full-grown plants two and one-half months.

4. The light is too weak to enable sprouting seeds to prosper or to bring adult plants to maturity."

At this point our own experiments were projected. These were begun in January, 1890, and have been continued uninterruptedly during the forcing season to the present time. I shall now invite your attention to a general survey of these investigations, referring you to our three bulletins upon the subject for the details. I

confess that I had expected to be able to reach definite conclusions at the close of the first winter's experiments; but at the present time, while we are engaged in the fifth annual series of investigations, we find ourselves still very far from definite conclusions concerning some of the primary and fundamental phenomena of the experiments. For four winters we endeavored chiefly to grow crops by the aid of the light, and although we have succeeded with several species, we have now given up for the time being all commercial or so-called practical considerations, and we are now endeavoring to discover the fundamental facts concerning the exact composition of the arc light, and its direct action upon vegetable tissue and physiological processes. Although this may seem to be driving the cart before the horse, it is nevertheless the necessary and logical order of experiment in untravelled fields, because we have first to discover the phenomena before we can search for their causes.

Our first experiment was with a naked two thousand candle-power lamp hung inside a forcing-house and running all night. A forcing-house sixty feet long and twenty feet wide was divided by a partition, one part being run in the ordinary manner, the other receiving electric light at night in addition to the normal daylight. The general effect of the light was to greatly hasten maturity, and the nearer the plants grew to the light the greater was the acceleration. This tendency was particularly marked in the leaf-plants, endive, spinach, cress, and lettuce. The plants "ran to seed" before edible leaves were formed, and near the light the leaves were small and curled. This is well illustrated in spinach. The electric light spinach matured and produced good seeds while that in the dark house was still making large and edible leaves, with no indication of running to seed. An examination of leaves of the plants under the microscope showed that while there was apparently the same amount of starch in each, it was much more developed in the electric light specimen, the grains being larger and having more distinct markings, and giving a better color test when treated with iodine. Lettuce, growing in a row nearly under the lamp, behaved in a similar manner. For three feet either side of the lamp, most of the plants were killed outright soon after they came up, and the remaining ones in the entire row (thirty-five plants) were seriously injured, the leaves curling and remaining very small. The plants increased in stature, vigor,

and size of leaves with increased distance from the lamp. Those nearest the lamp made most leaves early in their growth, and they maintained this advantage until about four weeks old, although the leaves were smaller. Five weeks after sowing, the average height of plants within four feet of the lamp was 1.2 inches; between four and five feet, 1.34 inches; between five and six feet 1.8 inches; between six and seven feet, 2 inches; between seven and eight feet, 2.2 inches. The average height of plants in the dark house at this time was $2\frac{1}{4}$ inches, and the plants were much more vigorous, and had larger and darker leaves. The increase in size was not uniform with increase in distance from the lamp. There were somewhat regular alternations of lower and higher plants, although there was a general progression in height. This alternating elevation and depression was probably due to the concentric bands of varying intensity of light which fall from the arc, and which are caused by the uneven burning of the carbons, those zones which were marked by the shadow giving the better results in growth. Cress and endive gave similar results. With endive we chanced to get a signal illustration of the injurious effect of the light. One of two parallel rows of plants was in the shade of a post, and while the exposed row gradually increased in size as it proceeded from the light, this shaded row gradually decreased, or was largest nearest the light where the shadow was most intense.

Some of the most marked results in this first series of experiments were obtained with the radishes. The young radish plants were strongly attracted by the light, and in the morning they all leaned at an angle of from 60° to 45° towards the lamp. During the day they would straighten up, only to reach for the lamp again on the succeeding night. This was repeated until the roots began to swell and the plant became stiff. As the plants grew, the foliage became much curled, and the amount of this injury was in direct proportion to the nearness to the lamp. Those nearest the lamp — within three or six feet — were nearly dead at the expiration of six weeks, while those fourteen feet away showed little injury to the leaves. The crops obtained in the dark or normal house were about twice greater than those in the light compartment. The entire plants and the tops were almost half lighter in the light house, and the tubers were more than half lighter, while the per cent of tubers large enough for market was as nine in the

light house to twenty-six in the dark house. And it should also be said that the average size of the tubers graded as marketable was less in the light house than in the other. A portion of a plantation of radishes in the light house was protected by the fan-shaped shadow cast by an iron post an inch and a half in diameter. In the shadow the foliage was scarcely injured, while those leaves which projected into the light were curled. Chemical analysis showed that the plants under the electric light had reached a greater degree of maturity than those in the normal or dark house. The ash was more, potash more than double, chlorophyll (including extracted gums) somewhat more. The total nitrogen was essentially the same in all samples, but it was noticeable that in the electric light plants more of the amide nitrogen had been changed into other forms than in the other sample; and the electric light samples were richer in albuminoids. The light house plants from the shadow were much nearer in composition to those in full light than to those in the dark house.

Dwarf peas in the light house, particularly those in direct light, blossomed about a week in advance of those in the dark house, and they gave earlier fruits, but the productiveness was less, being in the ratio of four in the light house to seven in the dark house; and the plants were considerably shorter in growth. The decrease in production was due largely to the fewer peas in each pod, for the number of fruitful pods produced in each case was as seven in the light house to nine in the dark house, and there were many seedless pods in the light house. In other words, the production of pods (or flowers) was about the same in both houses, but the plants in the light house produced only four-sevenths as many seeds as those in the dark compartment.

Carrots gave wholly indifferent results. They did not appear to be affected greatly even by the naked light, though growing but three or four feet away. Carrots require a long period of growth and were therefore exposed to the light for about four months, and yet the plants which grew directly in front of the lamp were but little inferior to those which stood ten or twelve feet away, or even to those in the dark house. No other plant in our experiments has withstood the electric light so well.

Here, then, was proof that two distinct series or classes of results proceeded from the naked electric light: plants are injured,

and they are forced into earlier maturity. We are, therefore, able to answer the two questions which we asked ourselves at the outset: 1. There is other influence than mere illumination in the electric light. 2. Different plants are differently affected by the light.

It now remains for us to determine how to avoid or correct the injurious effects while we still hold to some of the accelerating influences of the light; and we must also ascertain what plants most readily adapt themselves to such changed conditions of life as the electric light introduces. Both Siemens and Dehérain found that ordinary glass cuts off many of the higher refrangible or ultra-violet rays in which the electric spectrum abounds and which are too intense for the welfare of most plants. Common glass has this property in a marked degree, and it cuts off many of these rays in the solar spectrum. In our next experiment, therefore, the injurious portion of the electric light was cut out by a globe surrounding the arc. We first tried an opal or whitened globe, and the light, as before, ran all night. There was at once a marked change. The effect of the modified light was much less evident than that of the naked light. Spinach showed the same tendency to run to seed, but to a much less extent, and the plants were not affected by proximity to the lamp. Radishes were thrifty in the light house, and the leaves did not curl, but they produced less than in the dark house, although the differences were much less marked than in the former experiments. The loss in growth of radishes due to the electric light averaged from one to five per cent in the screened light, while the loss occasioned by the naked light had been from 45 to 65 per cent. It was noticeable, also, that while the tops or leaves were lighter under the naked light, they were heavier under the modified light than those of normal plants; and this is interesting in connection with the fact that lettuce did much better under the modified light than in normal conditions.

We had now prevented most if not all of the secondary injurious influence of the light due to the ultra-luminous portion of the spectrum, and we had found one plant — the lettuce — which was able to adapt itself completely to the new conditions and, by availing itself of the added light, had been greatly benefited. The other plants were unable to adjust themselves to the accelerated assimilation, and ran too quickly to seed, or

matured before they had attained a normal stature. The next logical step, therefore, was to run the light only a portion of the night, in order that the change from normal conditions should not be too violent.

The third stage in our experimentation, then, concerned itself with the naked light running the first half of the night. The foliage of radishes was noticeably larger in the electric light house, as it had been before under the modified light, but the tubers were practically the same in both houses, and the date of maturity was the same. Notwithstanding its greater size, the foliage in the light house showed some signs of curling. Peas were grown, and in every case they were larger and more fruitful in the dark house. The electric light did not increase the size of leaves, as it did in the radishes. These results, also, are similar to those obtained in previous experiments.

Lettuce, however, was greatly benefited by the electric light. We had found that under the protected light running all night, lettuce had made a better growth than in normal conditions, but now it showed still greater difference. Three weeks after transplanting lettuce of equal age upon the benches of the light and dark houses, the plants in the light house were fully 50 per cent in advance of those in the dark house in size, and the color and other character of the plants were fully as good. The plants had received at this time 70½ hours of electric light. Just a month later the first heads were sold from the light house, but it was six weeks later when the first heads were sold from the dark house. In other words, the electric light plants were two weeks ahead of the others. This gain had been purchased by 161¾ hours of electric light, worth at current prices of street lighting about $7.00. This experiment was repeated by reversing the houses for the purpose of eliminating errors, and the results were essentially the same. Seeds were sown in flats, Feb. 24, 1891. Until March 17th, they were grown under ordinary conditions, at which time they were set in their permanent positions in the two compartments. We began to pick lettuce from the light house April 30, but the first of equal size from the dark house was obtained May 10. The electric light plants were, therefore, upon the benches forty-four days before the first heads were sold. During this time there were twenty nights in which the light did not run, and there had been but eighty-four hours of electric light, worth about

$3.50. This gain of ten days in maturity is remarkable when we consider that the light never ran later than eleven o'clock at night; that nearly half of the nights had no light, and that the experiment was made late in the season, when the strong sunlight tends to obscure any effect of the artificial illumination. These results were uniform throughout a house 20×30 feet in extent, in both instances. All subsequent experiments strongly confirm these results; and nothing can be more definitely stated concerning the effects of electric arc light upon vegetation than that a 2,000-candle-power lamp, run half the night or even less, exerts a most marked beneficial influence upon lettuce throughout a house sixty feet square. In fact, I consider this point so well established that we have discontinued experiments in the general forcing of lettuce by the electric light.

The influence of this naked light upon productiveness and color of flowers was found to vary with the different species, and different colors within the same species. Several named varieties of tulips gave interesting results. When these came into full flower, it was found that in every case the colors were deeper and richer in the light house; but the colors lost their intensity after four or five days, and were then indistinguishable from those in the dark house. The plants in the light compartment had longer stems and larger leaves than the others; and there was a greater number of floriferous plants in the light. These tulips were grown at distances of ten and twelve feet from the lamp. Petunias were much affected by the light. The plants were much taller and slenderer in the light, even at the farthest corners of the house twenty and thirty feet from the lamp, and they bloomed earlier and more profusely. When the specimens were in full bloom, it was found that the height of plants in the dark house was to the height of those in the light house as five is to six. White petunias were not changed in color by the light, but purple ones quickly became blue, especially near the lamp.

Other flowers behaved differently, each according to its kind; but all those, of whatever species, which stood within five or six feet of the naked arc were injured. Flowers opening near the light were of short duration, but those ten or twelve and more feet away did not appear to be modified in this regard. But it was apparent that, in general, the light hastened blooming and caused the production of longer stems, but this effect was much obscured

by the injuries resulting from the unscreened arc. Subsequently we have found that the use of a globe or pane of glass will avert the injuries to flowers as well as to foliage, and the long stems and open inflorescence, together with increase in earliness in some cases, may be obtained without fear of injury. Yet we are not ready to recommend the electric arc lamp for the growing of flowers.

If the noxious effects of the electric light can be overcome by the interposition of glass, it remained to determine whether the light can be hung above the house to advantage, the glass roof serving as the screen. A lamp, surrounded by a globe, was hung six feet above the middle of a glass roof, and lettuce, endive, beets, radishes, and spinach, and other plants, were grown beneath. The lamp was so arranged that half the house had no electric light, while the other half received the full glare of the arc. The lettuce, as usual, was from a week to ten days earlier in the lighted compartment, and the effect was marked in the remotest corner of the house, forty feet from the lamp. Endive, which had been injured in other experiments, now showed no bad results, although it did not appear to be benefited; but radishes, which had been among the plants most seriously injured in all our experiments, now showed for the first time a decided gain in the light compartment, indicating that at a certain degree of attenuation, the light may be made acceptable to any plant. The plants in the light house were ahead in every feature. The proportion of tops to the entire plant was greater in the light than in the dark house, the difference being that between 55 per cent and 49 per cent. In 1890, under the naked light, radishes were uniformly injured, the loss ranging from 45 to 65 per cent; the same year, under a light protected by an opal globe, the injury was still apparent, but the loss in tubers was only from one to five per cent of the crop, but at the same time the weight of leaves was increased; now this year, under light strained through a globe and a glass roof, there was an increase in both tubers and tops. Similar results were obtained with beets and spinach; but cauliflowers were decidedly better in the dark house, thus adding a new source of perplexity, the discussion of which will be resumed presently.

Violets and daisies were also grown in this experiment. In both instances, strong plants were set in the beds a few days

before the light started. The violets (Marie Louise) were all set in the light house at twelve to sixteen feet from the lamp, where they received the full benefit of the light. Half of the bed of one hundred plants was covered each night with a black enamel-cloth box, provision being made for ventilation, and the other half received the light. Three weeks after the light started, the exposed plants began to bloom, while no buds could be found in the darkened portion. It was not until five weeks after the starting of the light that a flower appeared in the darkened plants, while the others had continued to bloom. Fifty strong plants of the low daisy (*Bellis perennis*) were divided between the two houses. Those in the light compartment were from fifteen to eighteen feet from the lamp, in rather weak light. The first bloom appeared just four weeks after the starting of the light, and it was in the light house. For a month or six weeks thereafter the lighted plants bloomed more profusely; but at that time the dark house plants began to surpass the others, both in numbers and size of flowers and vigor of plants. In other words, the lighted plants bloomed earlier and never made such stocky plants, and they soon exhausted themselves. It is probable that they would have endured longer if they had been established in the beds for a longer period before the light was put upon them.

In addition to all these plants, we have exposed many other plants to the influence of the arc light with varying and interesting results. Of these, the most obstinate appear to be cucumbers, tomatoes, and beans, none of which we have been able to persuade to cast off the ways of their fathers; but we are still hopeful that they may respond to the attractions of the higher education!

I have already referred to the poor performance of cauliflowers under the light; and this introduces a subject which I have only hinted at heretofore — the fact that the electric light often changes the habit or method of growth of the plant. The light makes cauliflowers grow tall, and draws the leaves up to a nearly vertical direction; whilst plants in a normal house or far removed from the light are lower and spread their leaves, at maturity, nearly horizontally. Plants near the light are also lighter green than others, and, contrary to other experience, they seem to be somewhat later in heading. The difference in stature of plants at distances of ten and fifty feet from the lamp was very marked, the average heights at these respective points being as five is to three.

The plants at the remote end of the rows, although lower and weighing only about four-fifths as much as those near the lamp, produced earlier heads. In other words, the light seemed to produce leaf and stem growth at the expense of heads; and this rapid growth of the strongly lighted plants was further shown by the much more brittle and tender tissue of these plants.

Most plants show a similar modification of habit under the immediate influence of the light. As a rule they grow taller. This tallness is ordinarily due to a longer growth, but it is sometimes only the result of erectness. Thus on the seventh of last month, I secured two pots of oxalis, each containing two plants of equal size, and placed one pot eight feet from the lamp and the other forty-five feet from it in diffused light; and at the same time I took two equal pots containing one plant each and set them in the same positions. Three weeks later there was a marked difference in the two lots, those nearest the light being considerably taller than the others; yet these tall plants appeared to have made no more growth than the others, for the total growth of one pot in the light was to the corresponding pot in comparative darkness as 58 is to 74, while in the other the ratio was reversed, being as 43 is to 33. This taller growth was probably a species of heliotropism or growing towards the light, for the artificial light proceeds from a definite point overhead, while the sunlight is much diffused.

In contrast to this behavior of the oxalis, however, may be cited the case of three equal primula plants without flower buds, which were selected for experiment the first of January. These were placed together twelve feet from the naked arc. One plant was unprotected, one was screened by a pane of window glass, and the third was covered at night so that it stood in darkness. Four weeks later the plants were in flower with little difference in the earliness of the first blossoms, although the plant screened by the pane was producing more buds than either of the others; but the plant kept in darkness was much shorter than the other two, for while each of them stood five and one-half inches high, this was only three and three-fourths inches.

It is important that we notice the fact in this interesting behavior of the primulas, that the fully exposed and the glass-screened plants seemed to be equal in every respect; in other words, the baneful influence upon primulas of the electric arc light of 2000 candle-power does not extend twelve feet. This

leads me to say, what you have no doubt already inferred from this discussion, that the injurious effect of the light ceases at certain distances, but that these distances vary for each species of plant. As a rule, there is little injury beyond ten feet, although certain coleus plants standing fifteen and more feet from the lamp are injured.

This leads me to ask just what these injurious effects are. It is now pretty definitely ascertained that they are due to the highly refrangible or ultra-violet rays of the spectrum; and these rays are mostly absorbed by plain glass. Plants set near the naked light soon show a browning of the leaves and fresh stems, and in some instances the tissues may be killed. But if a pane of glass is interposed before half the plant, the protected portion will be very little if at all injured; and the projecting leaves will usually show the exact line of demarcation between the screened and unscreened fields. The character of this injury may be learned from the following narrative. On the seventh of last December, a strong heliotrope which had two equal shoots springing from near the base, was placed about three feet from a naked arc of 2,000 candle-power. One shoot was screened by a pane of third quality single-thick window glass placed directly in front of it, while the other branch was fully exposed. Neither branch had made flower buds. The next morning, the light having run six hours during the night, both branches were strongly bent towards the lamp, and the exposed one, as well as the portions of the leaves of the other shoot which projected beyond the pane, showed a distinct brown discoloration. After three nights had passed, the exposed foliage began to curl, but the protected portion was pushing forward very rapidly and had already made good flower buds, while the other showed only the faintest traces of buds. After ten days, the exposed portions were much browned and stunted, and the small flower buds which had been formed appeared to be dead. On the seventh of January, just a month after it was placed before the lamp, the screened branch was in full and normal flower, whilst the other was little more than half as high, most of the leaves had fallen and the remaining ones were small, curled, and dry, and the few almost lifeless flower buds were unable to open. Other heliotrope plants set six feet from the arc showed trifling injury five or six days thereafter, but the exposed parts flourished and bloomed several days earlier than branches behind a pane, and the

flowers were in every way normal. Two branches which were of equal length when the experiment began, were thirteen and eighteen inches tall at the expiration of six weeks, the shorter and earlier portion being that which was fully exposed. It was therefore evident that while the naked arc is fatal to heliotrope at a distance of three feet, it is not injurious and it accelerates maturity at six feet. Coleus plants have proved to be most interesting subjects for experiment. The purple color of some leaves entirely bleached out in a few hours if exposed within a few feet of the naked arc, while those portions of the same leaves behind a pane of glass remain uninjured; and the line of demarcation between the two portions will often be as marked as if it were the impression upon a photographic plate.

It now remains to determine the nature of this injury. If a cross-section is made of an injured leaf of heliotrope, it will be found that the epidermal cells have collapsed.—the walls have fallen together; and as these dead walls become opaque, they obscure or cover up the bright chlorophyll beneath and make the leaf brown. The chlorophyll bodies themselves may be disorganized, although this result follows only as a secondary phenomenon. A careful study of many plants treated to the electric light, has enabled my colleague, Professor Rowlee, to ascertain the physiological effect of the injurious light. The ultra-violet rays produce great activity in the protoplasmic contents of the cells, particularly of the palisade tissue, or hasten the physiological processes. This activity calls at once for large supplies of water, and it is drawn first from the overlying epidermal cells; and these cells, being emptied of their contents, collapse like an empty grain-bag. The loose mesophyll or underlying portion of the leaf is abundantly supplied with moist air in the large intercellular spaces, and it is also in direct communication with the moisture of the atmosphere through the stomata; so the lower tissue is much less injured by the sudden withdrawal of water than the upper layer. In other words, vital activity is hastened so much by the naked light that the plant cannot supply materials quickly enough, and it is forced to death; but by removing the plant to greater distances from the lamp, a point will be found where water can be supplied with sufficient rapidity to meet the demands of the quickened activities, and the plant will grow more rapidly or at least mature earlier than in normal conditions.

In the coleus leaf, however, there are two somewhat distinct effects of the naked light which obscure each other. The leaf is injured by the process described above, and it may also lose its color. We soon found that some varieties of coleus are not bleached, but the upper epidermis simply becomes glossy by exposure to the naked light. Microscopic examination shows that those specimens which lose their color, hold the color pigment in the upper epidermis alone, and that it is extracted by the collapse of the epidermal cells, and the chlorophyll of the interior cells is exposed, causing the leaf to become greenish. Iresine (or Achyranthes) is one of those colored plants which hold the coloring matter in the interior of the leaf, and it is not bleached by the electric light. Knowing these facts, we are able to prognosticate with some certainty what plants will be injured in color by the arc light, for those which have the color distributed through the tissue and which are, therefore, not discolored, are, normally, nearly or quite as deeply colored on the under side of the leaf as on the upper side.

If the electric light exerts such profound effects upon the physiological processes of plants, we need not be surprised if it produces anatomical modifications. Bonnier is the only person who has investigated this subject. His experiments were directed to both trees and herbs grown under the influence of electric light run continuously with little aid from the sun, and the same light run for a part of the day only. His conclusions as to the behavior of trees are as follows:

"1. We can produce, by a continuous electric light, considerable modifications in structure of the leaves and young stems of trees.

"2. We can produce a condition in which the plant respires, assimilates, and transpires both day and night in an invariable manner. The plant then seems to be so much affected by this continuous light that the tissues take on a more simple structure.

"3. The intermittent electric light (twelve hours of darkness in the twenty-four), produces in the various organs a structure which approaches more nearly the normal structure than that produced by the continuous light."

His conclusions upon the structure of herbaceous plants are these:

"1. When the continuous electric light, under glass, produces in an herbaceous plant a large growth, with intense green color,

the structure of the organs is at first much modified or differentiated; but, if the light is intense, and continued during several months, without check or diminution, the new organs formed by the plants which adapt themselves to this light, present remarkable modifications of structure in their various tissues, and are less differentiated, while at the same time being rich in chlorophyll.

"2. The direct electric light is injurious to the normal development of tissue because of the ultra-violet rays, even at a distance of three meters and more from the lamp."

There remains one point to which I must call your attention: When do the lighted plants grow? It is known that growth is ordinarily more rapid at night. But when the sun supplies light by day and the arc lamp supplies it by night, at what time will the plant choose to perform this function? It is probable that most plants will grow more or less continuously, but more rapidly under the electric light. In fact, we have found that a petunia plant which was subjected to normal daylight, then to electric light until eleven o'clock at night, and to normal darkness from that hour until morning, grew most rapidly when the electric light was burning. Careful tests with lettuce gave the following conclusions: 1. That the electric light did not determine the periodicity of growth. 2. That increase of growth under the light occurred only during the first days of the experiment. 3. That growth in both the light and dark houses took place in daylight as well as in darkness.

I may now say, in conclusion, that the electric arc light exerts a powerful influence upon plants in greenhouses, and that all species, and sometimes even garden varieties, are affected differently. This varying influence is the effort of the plant to adapt itself to the new conditions in which it is placed, and the modification undoubtedly bears some relation to the elasticity or fixedness of the organization of the plant, and, therefore, to the conditions under which the species has been evolved. And it must, therefore, follow that if plants were to be subjected to the electric light through several or many generations, more or less adaptive varieties would arise, in the same manner in which plants have adapted themselves by profound variation to the requirements of greenhouse cultivation. The electric light affects plants by hastening growth or maturity; but this effect may be so powerful as to destroy the plant. The injury is avoided, however, by screening the light through a glass or by removing the plant to such distance that the

mischievous effect of the ultra-violet rays is dissipated. I consider it to be established that lettuce can be profitably aided by the electric light, and it is very probable that many flowers can be similarly benefited. Beyond this, I can only say that the fundamental principles involved are now pretty clearly understood, and that the near future should give us results of direct economic value.

II. The Application of Electricity, or Electric Currents, to Plant-Growing. There have been many attempts to determine the effects of electrical currents or electrification upon growing plants. The initial experiment was made by Maimbray in Edinburgh, so long ago as 1746. He submitted two myrtle trees to the influence of electricity, and found that their flowering was much hastened. A number of experiments followed at intervals, but the results were various and contradictory, and few conclusions can be drawn from them, until Grandeau approached the subject in 1878. It will be useful to take a very brief survey of these experiments, although I cannot discuss them so confidently as I have the influences of electric light upon vegetation, inasmuch as I have made no experiments in this direction myself. But the general trend of the subject, may, perhaps, be determined sufficiently for our present purpose.

It is necessary, before proceeding to a discussion of the subject, however, to say that the application of electricity to plant-growing is of three general and more or less distinct types: 1. The direct application of the current to the individual plant, by means of which the plant is electrified. 2. The application of electricity to the soil. 3. Its application to the atmosphere. Unfortunately, these distinctions are not always kept in mind in discussions upon the subject, and erroneous conclusions seem to have followed the confusion.

1. Concerning the direct application of electric currents to plants, little of an exact nature can be said. It is well known — and my own experiments have shown it as well — that a mild electrical discharge will often seriously injure plants. A few discharges from a small Holtz machine will cause many herbaceous plants to wilt, and if the application is continued for an hour or so, the plant may die. On the other hand, there are various instances recorded in which beneficial results have followed the application of a mild and steady current, as shown in more rapid

growth and earlier maturity of the treated plant. Yet we do not know whether such treatment can be employed to any practical extent, and it is highly probable that it will never become a powerful factor in horticultural practice. The most marked results with electrification are those in which the current has been applied to germinating seeds and ripening fruits, when it has been found, in many instances, to greatly hasten sprouting and ripening. It is probable that in this case the effect of the current is a chemical one in hastening the metabolism of the seed or fruit contents.

2. In the application of electrical energy to the soil, there are more definite results, yet the experiments are by no means uniform in their conclusions. In fact, there are the most opposed results, but this disagreement is no doubt very often due to unlike exterior conditions, and particularly to unlike species of plants which have been the subjects of experiment, and not to variation in fundamental action. This is well shown in the experiments of Warner, at the Hatch Experiment Station of Massachusetts, who was the first to enter this field in America. He found that parsnips, lettuce, salsify, radishes, and peas, were benefited by the application of electricity to the soil; but under the same conditions, carrots gave indifferent results, while turnips and beets gave decidedly poor return. There was even a difference between varieties of the radish, the White Strasburg thriving better than the French Breakfast. But even at the best, this application of electricity so far promises little in the way of commercial results.

Although it is not my purpose to analyze the results of the various experiments in the application of electricity to the soil, I wish to submit a few suggestions in passing. In the first place, it has not been proved, so far as I know, that the effects are due to the mere electrification of the soil. It is quite as probable that the injuries or benefits follow some chemical or mechanical effect which the current may exert upon the soil or the interstitial air. But what I particularly wish to say is that I have not yet read of an investigation in this direction which satisfies the demands of exact experimentation. The electric plots in these experiments are provided with wires or metal plates beneath the soil, while the control plots are left in a normal condition. The placing of the apparatus in the soil requires the removal and replacement of all or a part of the earth, and the soil is therefore in a different and

usually better mechanical condition than that of the control plots. Or even if the soil were to be removed and replaced in the controls, the presence of the wires and plates would of itself introduce a great element of error, for the wires would become important factors in aërating and draining the soil and probably in modifying its temperature; and metal plates would certainly be likely to influence soil temperature. It is well known that in certain cases the germination of seeds can be hastened by running a twig down to them: it becomes a means of providing oxygen from the air, and probably, also, of relieving the soil of some of its superfluous water. One of the important advantages of plowing under coarse manures or green crops is the mechanical effect which follows, for every strand of vegetable fiber forms a tube for the passage of water and air. And it has long been the practice in cool countries to put earthenware or other plates beneath fruit trees to warm their feet. While I am convinced that the application of electricity to the soil may produce marked effects upon vegetation, I shall not be ready to accept the results of experiments until the control plots are wired like the others — with non-conducting material, of course — and the temperatures and humidity of the soil are given careful attention.

3. It is very probable that atmospheric electricity exerts a powerful influence upon vegetation. The experiments of Grandeau, cited above, were designed to determine this point. Plants were grown in the free atmosphere, which is always in a greater or less state of electrification, and also in a wire cage from which the atmospheric electricity was excluded. Maize in the free air was in every way better than the other, not only in the bulk of all its parts, but in the amount of ash, and of both nitrogenous and non-nitrogenous matters. Leclèrc, who made investigations at the same time, arrived at identical results. Grandeau's conclusions are as follows:

1. Atmospheric electricity exerts a considerable influence upon the production of vegetable matter. Other things being equal, plants will develop better when exposed to the influence of atmospheric electricity.

2. Plants deprived of the influence of atmospheric electricity have, in the same length of time, given 50 to 70 per cent less bulk and 50 to 60 per cent less fruit and seeds than the plants subjected to normal conditions; *i. e.*, those to which atmospheric electricity has free access.

3. The proportion of albuminous matter does not appear to be sensibly influenced by the electricity, but those plants from which the electricity is withheld appear to contain less water and more mineral content.

4. Tall plants have a mischievous influence upon the development of those which grow at their feet, not only because they deprive them of heat and light, but also because they absorb the atmospheric electricity.

Celi, shortly afterwards, reached similar results, while Naudin arrived at directly opposite conclusions. But the signal results obtained by the first three experimenters are generally accepted as strong evidence that normal atmospheric electricity is in some way beneficial to vegetation, and that in the experiments of Naudin there must have been some unknown conditions which obscured the results.

By far the best investigations upon the electrification of the atmosphere in reference to plant-growing with which I am acquainted, are those made in Finland and France by Professor Lemström, physicist in the University of Helsingfors, with whom I have the pleasure of acquaintance. Lemström was first led to his inquiries by observations upon vegetation and meteorological phenomena — especially auroras — in the high north, particularly in Finnish Lapland and Spitzbergen, where he came to the conclusion that much of the rapidity of vegetation in the short summers is due to climatic electricity. His first experiments were made in the laboratory in 1885, and the results were so promising that he at once turned his attention to the field. During the summer of 1885, Lemström made an experiment upon a small field of barley, in Finland. One portion or the field was covered with small parallel wires, a meter apart, and secured to porcelain insulators upon short posts at the margins of the field. At intervals of a half meter, each wire was furnished with a metal point from which the current could discharge into the atmosphere. This covering of wires was attached to the positive pole of a four-disc Holtz machine, which supplied the current. The current was applied from the middle of June till the first of September, from six to ten o'clock in the morning, and from five to nine o'clock in the evening. The barley was well up when the experiment began. The harvest showed that the electric plot was over 35 per cent ahead of the remainder of the field in yield, and the quality of the grain was improved.

The following year, the investigation was continued upon a more extensive plan, with garden vegetables, and the results were strikingly interesting, although some plants did not thrive so well under the treatment as in normal conditions. The percentages of gain in edible products were as follows:

White Beets,	1 07 per cent gain.
Red Beets,	65 " "
Potatoes,	76 " "
Radishes,	59 " "
Parsnips,	54 " "
Leeks,	42 " "
Celeriac,	36 " "
Turnips,	2 " "
Ruta Baga,	1 " "

Plants which showed loss were as follows:

Carrots,	5 per cent loss.
Kohl Rabi,	5 " "
Cabbages,	43 " "

Two conclusions clearly follow from these results: Atmospheric electricity, applied artificially, may exert a powerful influence upon growing plants; the character of this influence varies with the species. Here, then, is another illustration that the response of plants to external influence is a matter of adaptation with each individual species, and which is probably governed by the phylogenetic history of this type.

Experiments were also made in Finland in 1886 and 1887, upon cereals and potatoes, and the general results were very favorable. Aside from this fact, two general conclusions are stated by the experimenter, drawn from all the foregoing experiments:

1. The plants studied fall into two groups—

(*a*) Those in which the electricity favors the development:

Wheat,
Rye,
Barley,
Oats,
Beets,
Parsnips,
Potatoes,
Radishes,
Celeriac,
Leeks,
Kidney Beans,
Raspberries,
Strawberries.

(*b*) Those in which the electricity more or less hinders the development:

Peas,	Turnips,
Carrots,	Cabbages,
Ruta Baga,	Tobacco.

2. The more fertile the soil, and, consequently the more vigorous the vegetation, the greater is the harvest due to the influence of the electric current.

It now remained to determine whether the results obtained in Finland can be expected in other parts of the world, or if they are possible only in high latitudes. The scene of experimentation was now transferred to France, where cereals, garden vegetables, and a variety of fruits were treated. An incident in this experiment was the behavior of strawberries which were subjected to an aërial discharge of from 2,000 to 3,000 volts continuously, night and day, from the middle of April to the middle of June. The first flowers appeared upon the 29th of April in the treated area, and upon the 7th of May in the other portion. The treated plants were in every way superior to the others until the 18th of May, at which time there followed eight days of excessively hot weather. The treated plants languished, and the yield was much less than that of the normal area. The conclusion drawn from this interesting test is that the simultaneous action of electricity and high temperature is injurious to plants, and suggests that the electric current be discontinued in the hottest part of the day, as had been done in the Finnish experiments.

The season of 1888, in France, was abnormal because of the excessive rainfall and coldness of the summer, yet the general results of the investigations were encouraging, and justified the statement that "the effect of electricity produced by the method described is the same in the two countries, from which one may conclude that the effect will be the same in all parts of the globe." And it is further concluded that "the effect of the electric current depends to a certain degree upon external conditions or environments in which the plant is placed; or, in other words, the more favorable the external conditions, the more marked is the effect of the electricity."

Although these remarkable experiments of Lemström have shown that the application of electricity to the atmosphere gener-

ally influences plants profoundly, and usually beneficially, it is yet undetermined just how this effect is brought about. It is highly probable, however, as Lemström himself suggests, that the modifications are not the direct result of electrification of the plants or the atmosphere, but rather follow some chemical change in the atmosphere which is engendered by the current. The experimenter is to continue his studies, and I expect to supplement them in America, for I consider it the most promising field in the many obscure interrelations of electric energy and horticultural practice. I expect little practical result to follow any method of direct electrification of vegetation, but there is promise in those broader applications which intensify the normal processes of Nature.

The announcement for the next Saturday was a paper on "The Construction of Plant Houses," by W. A. Burnham, Irvington-on-Hudson, N. Y.

MEETING FOR DISCUSSION.

SATURDAY, February 10, 1894.

A Meeting for Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair. The following paper was read by the author.

THE CONSTRUCTION OF PLANT HOUSES.

By W. A. BURNHAM, Irvington-on-Hudson, N. Y.

I have been requested to give a paper on Greenhouse Construction, and so far as practicable to illustrate by diagrams and plans the most approved construction. In accepting the invitation of your Committee I cannot hope to cover the whole field of invention and the plans which have been presented to the public as the *ne plus ultra* of greenhouse building, but will present only such modes and details of construction as have come under my personal observation during the past twenty-one years of my experience as a builder, and by their use have proved their adaptation to the requirements of a greenhouse.

The progress of greenhouse building during this time has been very marked, as also it had been during the previous ten years, so

that as a business of any dimensions or interest in this country it dates since the close of the civil war. It is true that previous to this date there were numerous elaborate private conservatories and extensive ranges of glass for commercial purposes, but mostly representing in style and detail the crude and inexperienced ideas of architects and carpenters. These buildings were generally unsightly in appearance, impracticable for the care and growth of plants, often very expensive to build, and by reason of their defective and improper details, very perishable and costly to keep in repair.

The evolution in greenhouse architecture and construction during the past thirty years has been remarkable. Probably in no branch of building in this country has greater progress been made. Commencing with structures for conservatory work, modeled and shaped like huge bird cages, and in construction clumsy and inartistic to a degree, without a pretense of adaptation to plant life — and, for florists' and amateurs' use, heavy frames covered with clumsy sash and small cheap glass — we now have conservatories and greenhouses which in artistic appearance add greatly to the interest and attractions of the best kept private grounds and public parks; while in lightness of construction, durability, and adaptation to their various purposes they have become one of the most inexpensive and satisfactory additions which can be made to a country home or city residence.

It is estimated that there are at the present time over six thousand florists in the United States, and about ten times as many private greenhouses as there are florists' establishments. Estimating the florists' houses to be worth $7,500 each, and those on private places the average sum of $4,000 each, we have a total invested in glass of not less than $285,000,000. These figures are no doubt considerably less than the actual amount so invested.

The progress which has been made in greenhouse building has been chiefly along the following lines:

1st. More artistic designs and adaptation to location.

2d. Better arrangement of plans for light, ventilation, and heating.

3d. Greater economy in construction and durability.

4th. General adaptation to the growth and exhibition of plants.

Selection of Plans.— To those proposing to erect a conservatory or greenhouse for a private place, as an attachment to a

dwelling or in the adjoining grounds, the selection of an appropriate plan is of the first importance. For such purposes particular attention must be given to the style, form, and ornamentation, to make it in keeping with its surroundings. This can be done only by the employment of some person of skill and experience in this special branch of architecture. When such an attachment is to be made to a new dwelling house, the architect of the latter should be consulted, but for ordinary detached buildings this is not necessary. An ordinary architect has little or no experience in such work, and while he may make a design in harmony with the architecture of the building with which it is connected, it would be a rare exception should the height and pitch of the glass be properly arranged to admit the sunlight to the best advantage, the ventilation proportioned and located to do its work effectively and without injury to the plants, or, what is of quite as great importance, should the design be made so that it can be executed by any known method of construction in a workmanlike manner.

To determine the size of the greenhouse to be built no rule can be given, as this can only be determined by the taste and requirements of each family. When these are known it is a simple matter to decide on the proper size. A rule frequently adopted, and which has some advantages, is to make the glass of such extent that the same help employed in the kitchen garden and on the lawn in the summer shall be kept employed in the winter months. It is better to adopt a size that proves too small than to build larger than is required. When necessary, additions to an ordinary greenhouse can be readily made. What can be worse than a larger house than is required, only partially filled with plants, or the space occupied with worthless trash, as is frequently the case? A smaller house containing only choice specimens, well kept, will cost the owner much less, and continue a source of satisfaction and pleasure to both the owner and gardener. The form of house which should be selected depends greatly on the kind of plants to be grown and the location. For roses, mid-winter flowering, forcing, and early vineries, what is known as the three-quarter-span, having the ridge running about east and west, with the long slope to the south, is generally approved. For most other purposes the full span house, the ridge running north and south, is generally used. The ridge and furrow style, being a series of full span houses united by means of wide, open gutters

between them, presents many advantages for a considerable range of glass. It is compact in the space required, and costs less for construction and heating.

The floor line of a greenhouse should usually be a few inches above the outside grade. Storage pits are an exception, and are generally arranged by covering an excavation with glass. As the object is simply to keep the plants from freezing, a low temperature is all that is required. This can be obtained from the natural heat radiated from the surfaces of the excavation, so that with a proper covering for the glass no artificial heat is required. In houses requiring a temperature of fifty degrees or more, such an excavation under them increases the amount of fuel required to maintain the temperature, as such surfaces, being below the temperature of the house, absorb a portion of the artificial heat supplied.

Recently another form of house has been added to those already so well known. It is a modification of the three-quarter-span house, having the short slope of roof on the southerly side. The height of both sides is the same. The pitch of the northerly side is from 22½° to 30°, and on the southerly side about 45°. The plant tables are all on a level. It is claimed for this style of house that in the dark winter months the sun's rays strike the glass at nearly right angles, and that in consequence more of the rays enter the house than through an ordinary pitch roof, and better results are thereby obtained; also that the low pitch on the north side allows the houses to be set up against each other in a manner similar to the ridge and furrow system already described. The claim that a greater number of effective rays of light enter the house where they strike the glass at right angles, than would enter the house through a longer plane of glass at a less pitch, is doubtful. A long, flat glass roof on the north side, where the sun never shines, to hold snow and ice until the warmth of the house melts it off, is certainly a disadvantage which can readily be appreciated in this latitude. Undoubtedly this style of roof admits a large amount of light, but in this respect it has no advantage over a full span roof running east and west. Architecturally it presents a very awkward appearance. The level table plan keeps all the plants except the front bench more or less in the shade of each other, which is largely avoided in the arrangement of elevated tables such as are usually adopted in regular three-quarter-span houses.

Location of Greenhouses.— In some grounds there is only one possible site where the greenhouse can be located. In such a case the question to be decided is as to the best form of house for the desired uses, which can be placed in the location. In other cases there is a choice of situation, when important questions arise as to where the house will look best on the grounds, be most conveniently attended, and accessible to visitors. It is seldom desirable to place the houses conspicuously in the front. Like the flowers, they thrive best in a sunny and quiet spot. They should not be placed too far from the dwelling, and should be located where they can have a pleasant approach through a well kept part of the grounds. The best location for a range of glass can usually be readily determined by one who has had experience in the choice of locations and is familiar with all the requirements. It is in choosing the site best adapted to the purposes of a greenhouse that the services of an experienced greenhouse architect will be found of great value to the owner.

Houses used chiefly for bedding stock and forcing purposes are usually best located near the garden. Where a range of glass is to contain a conservatory or winter garden, plant houses, fruit, and forcing houses, it is generally best to build them all attached, so that they can be attended and warmed from one point. The fruit and plant houses should not be mixed together but should occupy separate parts of the range. To obtain the best results the houses, such as rose houses, forcing houses, and early vineries, should have full sunlight on the south side, and no trees should be allowed on this side nearer than three times their height. For conservatories and other houses where palms, ferns, and foliage plants predominate, a location which excludes the direct sun is often selected, either from choice or necessity, and is very satisfactory. In respect to heating, the ideal place for a greenhouse is on a southerly slope, neither on top of a hill where the winds are severe, nor yet in the valley where the thermometer usually marks several additional degrees of cold.

Construction of Greenhouses.— After location and plans have been duly considered comes the equally important matter of construction. At the present time there are three general modes of construction from which those wishing to build a greenhouse can choose, and each, under certain conditions, would be preferable to either of the others.

First: Sash Bar Houses.— These differ from other houses in the bars being made of greater dimensions and strength, constituting the principal framework of the structure. The cheapest, though not the best mode, is this old-fashioned post and sash bar house, furnished with an entirely new set of details. As formerly constructed, it was so frail that it would last in good condition not much more than five years. Some houses of this class have been rebuilt three times in twenty years and are now in a very shaky condition. If they had been constructed in accordance with the new details, and with the materials now in use, they would easily have lasted without rebuilding until the present time. The construction is entirely of wood, except the purlin and ridge supports, which are usually gas pipe posts. A list and description of the different members which go to make a complete section of the house are as follows: ridge in three sections, so that the splices are mismatched, with side grooves for ventilators and glass; projections for support of lower edge of sash bars; and a dripped cap. The ventilators are of the usual style, but fastened together with light metal caps, so that although made in sections they are practically the same as a continuous single sash the length of each ventilating shaft. The gutter is formed in three sections like the ridge, so that all joints are mismatched. The joints are butted in lead, with metal slip tongues. The side posts are of locust, cedar, or cypress, and not less than six inches in diameter. For a slight additional cost iron posts can be substituted. The sides are of double boarding with two thicknesses of strong building paper between. The sash bars are of cypress $1\frac{1}{8}$ by $2\frac{1}{4}$ inches, rabbeted for the glass and dripped to carry away leakage and condensation. They are usually placed for 16-inch glass and continue from plate to ridge without framing. Stationary glass or sash ventilators can be substituted for the boarding above the side tables if desired. At the foot of the top ventilator a header is fitted over the bars without cutting them, receiving the glass, and in a simple and effective manner doing away with all framing at that point. Where a small original investment is an important factor, there is no construction superior to this. It is especially adapted for florists and market gardeners commencing business on a small or borrowed capital, where it is important to secure the largest possible income for the least present investment.

Second: Wood Frame Greenhouses.— The second style as to desirability and cost consists of an improved construction, wood forming the principal part of the frame. The sills are made in three sections to cap a brick wall, and are adjustable to its inequalities. The splices being made at different points in the length, the sill is the same as though of but one piece its entire length. The members of the sill are carefully pitched to turn off water. The rafters are in two pieces, the long roof piece running from ridge to plate, and the upright between sill and plate. These are joined at the plate or angle by means of a cast iron bracket securely bolted; a similar bracket is used at the ridge. The sash bars are $1\frac{3}{4}$ by $\frac{7}{8}$ inches, dripped to collect condensation. The purlins which support the light sash bars are of angle iron fastened by iron lugs, and bolted to each other through the wood rafters. There is no place left in this construction where the wood used is not protected in the most thorough manner against decay. The house is very light, and at the same time, strong and durable. This construction is only adapted for straight roofs. The form of the house is simple, but very neat and graceful. Perhaps a larger number of this style of house have been built than any other, and as they present equally as good an appearance as a more expensive construction, they are likely to remain a popular style of house.

Third: Iron Frame Greenhouses.— We come now to the third class, and by far the most important, as it embraces the best forms of construction throughout. It consists of wrought iron frame, cast iron sills, wrought iron benches with slate or brick bottoms — in fact every part of the house which bears any strain, or which if decayed would injure any other part, is of iron and comparatively indestructible. Wood is used as a cap for the iron work to prevent trouble caused by contraction and expansion, and as a setting for the glass.

The first range of glass where this construction was used was erected in 1881 for the late Jay Gould. At a recent interview, Mr. Mangold, Mr. Gould's superintendent, stated that so far as he knew not a light of glass had been broken by any settlement or by expansion or contraction during the twelve years since it was built, and with the exception of painting, there has not been a dollar's worth of repairs in that time. Before the erection of this house and the adoption of this mode of construction, the nearest

approach to it was in the conservatory at the Botanic Garden at the Capitol in Washington. That house was originally built entirely of iron, the glass being set directly on the iron rabbets. In this form it was not a success, and after repeated repairs and modifications, wood rabbets for the glass were substituted, and in this modified form it has since been fairly successful. The experience of Superintendent Smith with this house and his valuable suggestions led the way to a decided and important improvement. During the winter of 1880–1881, Mr. Gould's extensive range of glass and collection of plants were entirely destroyed by fire, caused by a defective flue. The old houses were of wood construction, and Mr. Gould requested that if possible the new ones should be of iron. Up to that date there were no greenhouse builders in this country using iron for construction, so that to meet Mr. Gould's desire, it became necessary to plan a new departure in the method of construction. With the experience of the Botanic Garden in mind, the new details were perfected and successfully embraced in rebuilding Mr. Gould's houses, and were almost immediately adopted by the late Peter Henderson in an extensive range for commercial purposes. With such endorsements the new method of construction soon became popular, and most of the important glass buildings erected since that time have been built on substantially the same plans. The winter garden and greenhouse of William B. Forbes at Milton was one of the earliest examples of this style of construction in the vicinity of Boston. The system admits of any form of roof which may be desired, from a plain and simple lean-to, to a large, full span, curvilinear structure, with Gothic or ogee curves. In curvilinear work it has entirely superseded the former wood construction.

The iron sill is cast in sections of the same length as the distance from centre to centre of rafters, usually six to eight feet long, and shaped to cap an eight or twelve inch wall, according to the size of the building. A lug is attached by a tap bolt to the end of each sill; the rafter is placed so that it rests partly on the end of each sill, and when a single bolt is placed through both lugs it will be seen that the two pieces of sill and rafter are all substantially secured. The expansion of the sills is allowed for in a very simple manner by drilling the holes in the lugs slightly larger than the tap bolts. The form of the sill is such that great strength is obtained with the use of but a few pounds of metal

per foot. The top of the sill is beveled so that it does not hold water, and is provided with a stop cast on solid for the ventilator or sash to close against.

The wrought iron rafter is formed of refined bar iron from ½ by 3 inches dimensions for small houses, twenty feet and less in width, to ¾ by 6 inches for houses having a fifty feet span. This iron can be had in any lengths desired and can be bent to the shape of the roof, cold, by means of a screw or hydraulic press. No matter what the shape of the roof, this supporting rafter can be bent or welded to conform to it, giving equal strength with a simple straight line house. Purlins are placed laterally between the rafters about four feet apart. These are made of wrought iron bars or angles and serve to brace the rafters sidewise; also for the support of the light sash bars and glass. In joining the purlins to the rafters care must be taken to allow for the expansion of the metal and some special provision must be made for it, as, when the sun shines directly upon the iron, it has been known to expand nearly ⅛ inch in an ordinary length of purlin. Such an expansion in each purlin in a house one hundred feet long would amount to a total increase in the length of between one and two inches, and would cause certain destruction to the glazing and other parts of the structure. In this connection the experience of one of the proprietors of an important New England iron works may be of interest. He stated that his father, who was an expert engineer and had established the works many years before, had built himself an iron framed greenhouse. The first season it was ruined by contraction and expansion of the metal. With this experience as a guide he attempted to remedy the trouble, and made extensive changes to cure the defects, when it was again badly damaged. This time he gave it up and rebuilt it with wood, saying that an iron frame was not adapted for greenhouse purposes. This old wooden greenhouse, after standing many years, was replaced by one of the modern iron constructions with entirely satisfactory results. The amount of wood used in this construction for sash bars, caps, sashes, doors, etc., is very small, and as no weight or strain of the building depends on any piece of it, and as each piece is itself supported by the iron frame, a very long time must elapse before any repairs are needed; but when that time comes any part of it, or all, can be readily renewed.

Ventilation.— How the ventilation shall be arranged in the house depends on the form of the house and the plants to be grown in it. In the old-fashioned greenhouses the ventilation at the ridge was generally provided for by means of a few detached sashes opening at different points on the roof, either hinged or sliding, and usually operated with a cord and pulley or a lever attached to each sash. The great amount of extra labor and inconvenience of this plan was not its only fault. When the sashes were opened for ventilation there was a strong draft, the warm air of the house escaping at one opening and the cold air rushing in at another. This was likely to occur with the most careful handling on the part of the operator.

The present system of long lines of ventilators opening gradually and together by means of a gear and worm apparatus, or other device, is a change for the better which those who have used both the old and the new way can best appreciate. The usual practice is to hang the upper ventilators to the ridge. Sometimes the hinges are placed at the bottom of the sash so as to open them out from the ridge. There does not seem to be much difference in the two plans in regard to ventilation or protection from the winds when in use; there is, however, a decided difference in the mechanical construction, in favor of having them hung to the ridge. It is usual to place only one line of ventilators on a three-quarter-span house at the ridge, and no matter how they are hung, there must always be more or less trouble with winds on one side of the house or the other. To avoid this difficulty and increase the amount of ventilation, in some modern three-quarter-span rose houses two lines of ventilators have been adopted at the ridge. On windy days the ventilators in the opposite side of the roof can always be used. While it involves some additional expense for ventilating apparatus, it secures perfect ventilation and freedom from injurious drafts. For rose houses and others which are to be run in the summer months, side sash ventilators opened in connection with the top ventilators will reduce the temperature in the house on a hot day to within a few degrees of the outside temperature. This double ventilation forms a current under the glass so that most of the heat from the roof passes out of the upper ventilators and does not come in contact with the plants. Where the sides of palm houses and conservatories are of considerable height, the side ventilation should be placed close up to the

plate and the heat will pass off without injury to the plants. If the ventilation is at the bottom and top of a high house, it acts like a chimney in creating a strong and injurious draft, drying the plants, and passing off the cooler air of the house instead of the heated air next to the glass. Without doubt, the system of ventilating apparatus having gear and worm attachment for opening the ventilators is the simplest in construction, neatest in appearance, and the least likely to require repairs. It is the only system adapted to all kinds of conservatory work, where a good appearance is an important consideration.

Glass.— A very fine quality of glass for greenhouse purposes is now made in America. This statement may be a surprise to some who have been in the habit of depending on foreign importations for a superior article, and it is only within a very short time that such a statement would have been true. The use of natural gas and other improved methods in its manufacture, and greater care in selecting the grades have established its equality. The double thick will average nearly ten per cent thicker and stronger than the French glass, and in a hail storm this might easily mean the difference between a broken roof or one that stood the storm. The size of glass to be recommended depends largely on the style of roof to be covered; 12, 14, and 16-inch widths and lengths of from 16 to 24 inches embrace the sizes best suited to greenhouse work. The use of obscured or ground glass in conservatories and houses for palms, ferns, and tropical and other foliage plants is generally commended by gardeners and florists who have had experience in growing plants under it. Its advantages are in not drawing or burning the plants, no matter how far they may be placed from it; it renders the light more soft and genial, the coloring of the flowers and foliage is improved and retained in good condition a much longer time, and the unnatural burning sensation caused by the sun shining through clear glass is effectively removed without perceptibly diminishing the amount of light in the house.

Glazing.— What is the best method of glazing? is a question which is frequently asked, and in many cases not from mere curiosity but from a very laudable desire to secure something better than the inquirers now have, or, if about to glaze a new house, to do it in the best way. There is nothing in the market at the present time but what has been fully tested and its merits and

failures known. Various patents for metal sash bars have from time to time been issued, and judging from the claim of superiority made by the venders, perfection in glazing has been reached. There is a sentiment entertained by some, particularly those who do not know the special conditions to be met in glazing a greenhouse, that metal is more lasting than wood, but a little consideration of the subject will serve to show why so little success has been achieved in this style of glazing. It will be shown by an examination of any so-called puttyless glazing that it is not tight, or if tight when first erected it has not remained so. If a soft metal like copper, lead, or zinc is used, it has no elasticity and when expanded by the heat it does not contract again to its former shape, and in a short time the metal sags away from the glass until there is a considerable opening along every joint. These metals, including galvanized iron, are not, when rolled out thin and subjected to the conditions of a greenhouse roof, as durable as wood. All these metals have great conductivity of heat and cold, causing a large loss of heat when used as sash bars, whereas wood is one of the best non-conductors. It is impracticable to set glass without the use of putty or its equivalent, either in wood or metal bars. Common sheet glass has a concave side and all the edges of each light are more or less curved, so that to clamp them down to straight lines between two pieces of metal or wood, as is done in every method of glazing without putty, breaks many lights while the setting is being done and is followed later by more breakage as the glass is subjected to any additional strain. The larger the size of the lights used, the greater will be the curves and consequent breakage. By bedding the glass in putty these inequalities in the lines of the glass are allowed for and there is comparatively no breakage. The bars should have V shaped rabbets so that the putty cannot work out. By the use of proper machinery the spacing for the glass can be made so perfect that when the outside of the bar is painted the glass cannot be removed without first scraping off the paint. The best glazier could not make a good job of glazing on a roof where the spacing has been carelessly or improperly done. Much depends also on the quality of the putty used. The best is made from kiln dried and bolted gilder's whiting mixed with pure linseed oil. As the wholesale price of the best putty in the market is generally quoted at less than the first cost of the honest ingredients bought separately, it

is apparent that most of it is adulterated by the manufacturers. Such an adulterated article might answer for sashes in dwelling house windows, but its use in greenhouse work has caused most of the discredit to putty glazing and should be carefully avoided.

Painting. — For painting a greenhouse there are no better materials than pure white lead and raw linseed oil. Adulterated white lead and various mixed paints have been recommended and used, but in the end have proved more expensive, and have frequently caused serious damage to the glazing and framework.

The paint should be applied and rubbed out thin. The priming or first coat should be put on the material before it leaves the factory. If heavy coats of paint are put on one over the other it is likely to form itself into a separate body, become detached from the wood, and, as painters say, "peel off." On new work for commercial purposes two coats of lead are sufficient. On conservatories and private greenhouses where more attention must be given to the finish of the work, a third coat should be added. In this case the priming coat should be a mixture of raw oil and whiting, yellow ochre, oxide of iron, or other pigment which when applied forms no body. In such painting the preservative quality is principally in the oil. All new woodwork should have an additional coat after standing one year. This fills the cracks and joints which are likely to open in the best work when first exposed, and renews the paint which was first applied by re-supplying to it the oil which has been absorbed by the new wood.

To keep a greenhouse roof in good repair it should be repainted every two years. It is safe to say that a roof which is regularly and properly cared for will last twice as long as one which is neglected for several years and only repaired when it must be, at a greatly increased expense.

Plant Beds.— No part of the structure requires more care in construction than the benches. A bench which would be appropriate for commercial purposes, or in a growing house in the kitchen garden, would disfigure a show greenhouse or conservatory. A substantial and inexpensive plant table for commercial work or a low priced greenhouse is made as follows: Take ordinary hemlock studs $2\frac{1}{2}$ inches by 4 inches or a low quality of pine, lay one line on the ground for the legs to rest on, and set up pieces of the same size about two feet long and four feet apart for legs,

and on top of these legs fix a string piece of the same timber. The corresponding string on the back can usually be attached to the posts or frame of the house, or may be supported on legs the same as the front. Bands can be fastened to the string pieces for sides of beds of whatever depth desired, and the bottoms made with 1-inch or 1¼-inch boards or strips laid in loose, supported at either end by the string pieces. One of these bottom pieces should be nailed in fast to every four feet in length to hold the bench together in width. Where the beds are of considerable depths the sides can be secured by light wrought iron braces with slight expense. This arrangement of loose bottoms secures perfect drainage, is convenient for cleaning the bottoms when replanting, and for replacing any decayed pieces. The same general style of construction, with the substitution of Georgia pine or cypress lumber in place of the hemlock, omitting the timber on the ground and supporting the legs on piers or on the edge of a cement walk, is probably the best sort of construction that can be adopted where wood alone is used for the bench. Iron frames with slate, tile, or brick bottoms, have come into very general use. They are usually made of wrought iron, light angles and tees, framed together and supported by upright pieces of gas pipe. Slate bottoms are considered the best for tables where the plants are grown in pots. For the bottoms of beds, common hard-burned red brick are durable and inexpensive, affording perfect drainage, and possessing all the advantages for plant growth as to absorption of warmth and moisture under the soil, in a degree superior to that of any other bottom. For propagating and other beds requiring special bottom heat, the brick bottoms have decided advantages in retaining and evenly distributing the heat to the sand or soil of the bed. As each brick is capable of absorbing and retaining nearly a pint of water, such a bottom serves to dry the bed when too wet, and to add moisture before it becomes too dry.

Lumber. — The durability of a greenhouse depends largely upon the quality and kind of wood which is used in it. Soft white pine, free from knots, sap, and shakes, has until recently been considered the best lumber to use. Houses are now standing and in good repair, built of this wood, which are from twenty to thirty years old. But such material, which was formerly plenty in the

market, cannot now be had. The choicest grades and highest cost white pine lumber which can now be obtained contains a large proportion of white, or what is known in the trade as "bright", sap. The medium and lower grades contain still more of it besides other imperfections. It has become impracticable to obtain white pine of the same quality as formerly used. Long leaf yellow pine also has advantages and is well adapted for florists' houses and for plant beds, as it is strong and durable; but, as it does not hold paint well, it is not suitable for conservatories and greenhouses which require nicely finished work. Owing to this fact, builders who desired to keep up the standard of their work, looked about for a substitute, which was found in cypress. It has not only proved itself a substitute, but in the qualities most necessary for greenhouse work it is far superior to pine. It is more lasting. Examples are numerous of shingle roofs which were put on more than a hundred years ago — three or four times the age which the best pine shingles are expected to last. Cypress is used extensively in the South for posts on which dwellings are supported, fence posts, and railroad ties, and for all purposes where the wood comes in contact with the ground; and in the North it has been used for years for water tanks and gutters. Its durability for such uses is on a par with red cedar or locust. The best quality is known as red cypress and comes from the Gulf States. It should not be kiln dried. After it is perfectly air dried and ready for use, it shrinks less when exposed to heat and swells less when exposed to moisture than any other known wood. For these reasons it holds paint better than white pine, and these qualities peculiarly fit it for use in greenhouse construction.

Heating.— There are but two systems of heating which are generally approved for greenhouse purposes, viz., steam and hot water. In conservatories and greenhouses of ordinary dimensions for private use and which are not sufficiently important to require a night attendant, hot water has advantages and should be adopted, and with the ordinary attention given to its regulation and radiation, pipes of four inches external diameter will be found the most satisfactory. For large ranges of glass, consisting of say ten thousand feet or more, steam has advantages and should, under ordinary circumstances, be adopted.

Foundations.— Stonework, showing above grade from two to four feet, forms the handsomest foundation for a glass building in

a public park or private grounds where the other improvements on the place are in keeping with it. The cost of a well built stone foundation is about twice as great as one of ordinary red brick. Brick makes a good foundation, and, if built hollow and laid up in Portland cement, will serve all practical purposes as well as stone. Below the grade, common rubble stonework or concrete is the cheapest and best. The cost of mason work foundations has always been a large proportion of the entire expense of the erection of a greenhouse. To avoid or reduce this part of the cost has been a study with builders, and quite recently this object has been very satisfactorily attained. In place of the foundation wall cast iron posts are substituted and placed under each rafter. To these a base plank is fastened in such a way that it can be readily removed, whenever it may become necessary, without interfering with or injuring any other part of the work. The expense of replacing this base when necessary will be slight. The sides of the house above the base are double boarded, with a double lining of substantial building paper between. This construction is not recommended for the best work but is substantial, and for ordinary conditions it will be found satisfactory. The large reduction in the cost of the completed structure will enable many to build who otherwise could not afford a greenhouse.

Walks. — Tile walks are frequently used in conservatories and add to their attractiveness. Portland cement walks are cheaper than tile, and when put down smoothly and regularly in blocks are very substantial at a moderate cost. In vineries, wood slat walks are used; these are made in sections in portable form and laid directly on the borders. Slat walks are also frequently used in low cost greenhouses and are quite inexpensive, but as they lie directly on the ground they must be renewed in six or eight years.

In commercial houses cinders are extensively used for walks and cost very little. There is no reason why such walks should not be used in private places where the houses are employed entirely for growing, and not for exhibition or show houses, at a considerable saving in the cost of construction.

Potting Room. — A greenhouse is not complete without a potting room attached, where the work of potting plants, washing, etc., can be conveniently done. It is usual to put the heater in the cellar under this room. By making the potting room walls of brick, and the floor of iron beams and arches, the potting room will be nearly fireproof. Almost the only danger from fire to a

greenhouse is its attachment to the potting house, and if this is made fireproof insurance is unnecessary. The size of the potting room depends on the extent of the glass. A very good way to determine the size is first to ascertain the cellar space required for the heaters and a winter's supply of coal, and this area will be found in most cases to approximate a convenient size for the work room.

The cheapest way to construct a work room is to extend the frame of the greenhouse over it, either covering it with glass or substituting in its place shingles or tin. The most common building for this purpose is a one story frame structure, with shingle roof, beveled or novelty siding, narrow matched beaded ceiling inside, and Georgia pine or spruce floor, and provided with ample windows for light, and potting bench and soil bins. In buildings which have an area of two thousand feet or more a small office and seed room partitioned off from the potting room are desirable.

Discussion.

Francis H. Appleton inquired as to the durability of iron posts under the sills of greenhouses.

Mr. Burnham replied that iron posts have been in common use during the past five years; and many have been used in this way for ten years or more. These show some slight corrosion, but the actual loss or waste is not appreciable. From observation of similar uses of iron supports during longer terms, it is fair to say that cast iron used for such supports is practically indestructible.

In answer to another inquiry he said that the purposes of ventilation are, to regulate the temperature, to get rid of deleterious gases, and to introduce fresh air.

To a question as to the feasibility of combining steam and hot-water heating, Mr. Burnham replied that various machines are found in factories which are supposed to do many things. But experienced manufacturers always avoid such machines, as they are generally unreliable in use for either purpose. The same principle is involved in trying to heat a building with both steam and hot water from one apparatus. The pipes cannot be fitted to serve the double purpose as satisfactorily as for either alone.

In regard to overhead heating, Mr. Burnham cited an instance of a large building sixty feet high. When artificially heated by steam coils on the floor at the sides of building there was but one degree's difference in temperature at the floor and at the ridge;

but when heated by the sun, the difference was increased to three or four degrees. In this case the circulation of the warmed air was perfect, as was shown by the slight motion of foliage at various elevations.

In another large conservatory, which was heated in part overhead, the difference in temperature at the floor from that at the ridge was ten degrees or more, and there was no perceptible circulation of the air.

In the lofty building there were no pipes in the centre, but in the latter house there were central pipes, and the air was, in effect, bottled up or stationary. Still air is the best non-conductor. The lecturer said that he would never put any heating apparatus in the ridge of a building. By having ventilators at the ridge, and side ventilators at the plates, the extra sun-heat is carried up the glass roof without penetrating the centre of the house or coming in contact with the plants, and the admission of cold air at the sides will force out extra heated air at the top, and carry out gas also. But watchful care is necessary to prevent any strong drafts through the interior of the greenhouse, which every florist will agree is very objectionable. An English gardener, on first observing this system, objected to it quite strongly; but after a few months' experience and observation he declared that this house was the best ventilated of any he was ever in.

There is a tendency among florists to dispense with side ventilation to a large extent. They seem to consider two continuous lines of ventilators along the ridge, one each side, to be the best; that if opened on the north side when the wind is southerly, and opened upon the south side when the wind is northerly, they have the perfection of ventilation. We should bear in mind that much ventilation is given by unavoidable openings, as greenhouses are rarely tight.

As to the aspect of the greenhouse, a three-quarter-span roof extending nearly east and west, facing south, would be the best for rose houses. If this house be turned round and the glass is run down to the level of the bed, we have the modern, short south-roof plan. In an ordinary three-quarter-span house, by bringing up the benches, plants can be grown uniformly near the glass.

In a range of adjoining houses there is no opportunity to let in air at the sides. If your house is twenty feet high the plants will be from fifteen to eighteen feet from the glass.

Reference being made to the house with a short slope to the south, Mr. Burnham said it was a good house for some purposes, as it admitted a good deal of light to plants which could be grown near to the glass; but during the prevalence of snow and ice, it might remain covered by them a week or more at a time, which was an important drawback from its usefulness. It has been recommended for forcing vineries, but has no advantages for this purpose. The best form of house for grapes is the full span, with curvilinear sides, ridge running north and south. This form utilizes the sunlight from the rising to the setting of the sun, as some portion of the glass is always at the proper angle for that effect. A house of this style, but running east and west, was built for the late William Astor; the south side for forcing, the north side for retarding the maturing of the grapes. Into the latter portion very little direct sunshine penetrated, and the crop of fruit ripened at about the holiday season. The borders, when frozen, were covered so as to keep the vines from starting until about June 1st.

In answer to a question as to the preferable size of glass for greenhouses, Mr. Burnham stated that the general opinion among florists would favor sixteen by twenty-four inches. The larger sizes come into what the trade call "the next bracket" and cost about two cents per foot extra. Glass fourteen to sixteen inches wide, by sixteen to twenty-four inches long is preferable to larger sizes, making the tightest glazing and involving the least cost for repairs. If the larger glass is used, the sash bars must be increased in depth. The careful glazier will assort glass into three grades, as straight, curved, and much curved, and set the lights which are alike together, thus avoiding openings at the laps.

Mr. Appleton asked whether there would not be trouble with vermin in a house where iron posts were used. Mr. Burnham answered that, as compared with a solid masonry foundation, there might be some objection to the posts on this account, but it would not be fatal to their use; in the past most florists' houses have been built on wooden posts without serious trouble from vermin. As compared with a dry stone wall below grade, as frequently used, where vermin could harbor for the winter, the iron posts would be decidedly preferable.

The President announced for the next Saturday a paper on "Mushrooms," by William Falconer, Glen Cove, N. Y.

MEETING FOR DISCUSSION.

SATURDAY, February 17, 1894.

A Meeting for Discussion was holden today at eleven o'clock, Vice-President FRANCIS H. APPLETON in the chair. The following paper was read by the author:

A TALK ABOUT MUSHROOMS.

By WILLIAM FALCONER, Editor of "Gardening," Glen Cove, N. Y.

As the *modus operandi* of growing mushrooms is detailed in almost every book on horticulture, in the seedsmen's catalogues and repeatedly in the gardening papers, I will confine myself to a talk about mushrooms, rather than elaborate on how to grow them. Mushroom growing is becoming quite an important industry in this country and it is attracting great attention. Prior to a few years ago a peculiar veil of mystery hung over this branch of horticulture, and gardeners alone indulged in it. Mushrooms were cultivated in the dark, in caves and in cellars; the seed was not sown; the plants were not set out; spawn was indefinable; successful cultivators were silent, and the general public were kept in darkness. But it is not so now. The people are beginning to see through it; they have an intuitive sense that there is money in it; they are throwing themselves into the venture. Within the last four years mushroom growing in this country has quadrupled in extent. The production of mushrooms, however, has not kept pace with the increased volume of cultivation, because there have been many failures. But the industry has become firmly planted; the people are talking of it; they are seeking information about it; they see an addition to their incomes in it, and they are going to try it. This ambition is not peculiar to horticulturists alone; it is more evident in amateurs — in fact some of our largest mushroom growers in the country are not horticulturists, but manufacturers and others, who, having unoccupied caves or cellars, have gone into the business with the view of profitably utilizing room that would otherwise be idle and unproductive.

Florists have gone into the mushroom business in a surprising manner; tackling it systematically; occupying with it thousands of square yards under their greenhouse benches, that otherwise would be worthless to them. In these latter cases, mushrooms

are a comparatively inexpensive auxiliary to their other business; almost all they receive from it, above the price of labor and spawn, is net profit; for they need the loam and rotted manure in their florist-work anyway.

Chicken raisers have also taken to the mushroom business for profit; they want to grow something that will bring them money in the winter time.

I need not tell you about the increasing enthusiasm of private gardeners, for in the neighborhood of Boston you have among them some of the best mushroom growers in the country.

What will be the effect of this rapid increase in the production of mushrooms? It will reduce the price from a fictitious to a popular basis, and place a wholesome delicacy on the tables of the middle classes, which, hitherto, has been restricted to those of the wealthiest. Many families who now use the tasteless, indigestible putty-balls from imported cans, will repudiate the foreign article and accept no other than the wholesome, toothsome, juicy domestic product.

But we should see to it that the price does not fall so low as to render the cultivation of mushrooms unprofitable. How can we do this? By proclaiming their virtues and making them popular with the multitude. Eat them yourselves and encourage others to eat them. Talk about them; write about them; keep them continually before the minds and eyes of the people; make them popular and increase their consumption; the demand will then regulate the price. To make mushrooms generally popular three things are necessary, namely, to increase the supply, moderate the price, and bring them to the notice of the people.

Messrs. J. M. Thorburn & Co., of New York, wrote to me the other day: "If mushrooms could be obtained in the market at moderate prices, the demand would increase tenfold at once." A Philadelphia gentleman writes me: "One thing we have pressing need of now, is a good Distributing Agency in every big city. Take Philadelphia; if it was properly canvassed by a well equipped company for distributing the product of the growers direct to the consumers, it would use twenty times as many mushrooms as it does now. There are a few commission fruit men here, who have most of the business, and they cater to some of the hotels, and the enormous host of well-to-do people are not approached at all. Another thing — these well-to-do folks are

lamentably ignorant of the delicious morsel, and need educating up to the gastronomic delights they are missing by not having fresh mushrooms frequently on their tables. Let us tackle this matter of educating the great American public, not forgetting the great American cook. There is no limit to the extension of the industry."

Oh, the cook! How few hired cooks can cook mushrooms! Improperly cooked, this esculent is tough, leathery, dry, tasteless. Properly cooked, it is the most delicious morsel in the vegetable kingdom, and with an aroma to tempt the gods. A few weeks ago I sent a small basketful of the new mushroom to Dr. Thomas Taylor, Chief of the Division of Microscopy, of the Department of Agriculture at Washington. In replying he said that "to test their edible qualities I tried the skill of our cook in the Lunch Room here today (February 3); but she made a 'mess' of them and literally spoiled my anticipated feast. I was especially disappointed, as I had invited the Secretary to try a part of them."

As it is, however, there is a sure and growing demand for fresh mushrooms. A lady in New York's most select society said in my presence, some weeks ago: "It is'nt polite to give a dinner without mushrooms." This is law with the four hundred. And what is politeness in that inner circle, is as firmly fixed politeness in the ten thousand other wealthy families in that city who may not bask in McAllister's grace.

Many of the old market gardeners are bewailing this sudden increase in the production of mushrooms and the consequent lessening of prices. They are not making as much money off the same quantity of produce as they used to and are becoming dissatisfied. It is the same in the mushroom business as it is in the florist's business. Ten years ago not one-third as many cut flowers were grown for market as there are now, and prices have dropped accordingly. But multitudes use flowers now that didn't use them then. The abundant supply has created a popular demand, and so far from crushing out the florists, new men are continually going into the business; old florists are increasing their plants, taking advantage of better conveniences, improved methods of cultivation, and easier facilities for marketing. Adopting these new ways of lessening the cost of production is the secret of the florists' present success.

Between twenty and thirty years ago the supply of midwinter lettuce was obtained from cold-frames and hotbeds — an exceedingly costly and laborious method — but prices ran high and gardeners made a living. As winter salad was an expensive luxury restricted to the wealthy, the demand was limited. Then the South became prominent in truck gardening in winter, and shipped its product to the North. This additional supply had the effect of lowering the price, and northern gardeners had either to devise some other means of growing lettuce in winter, than in outdoor frames, or hand the business over to the South, for they could not compete with the southern prices. Did they hand it over? Ride out to Arlington, look upon the villages of greenhouses there for forcing vegetables, and find the answer. No, they devised means by which they produce a better and more marketable article than they used to raise in frames. They do it at a third of the former cost and in quantity impracticable by the old method, and they are superseding the southern product in the market, and the northern gardeners are making money. The cheap and plentiful truck of the South gave lettuce to everybody, making its use universal and the demand is insatiable. With no greater demand than we had twenty-five years ago, the Arlington of today would swamp the eastern market.

And so it must be with mushrooms. The period of a limited supply and high prices is past. A popular wave in mushroom growing has set in, and it now behooves us to devise some improved or new method of cultivation, by which we can produce mushrooms at the low prices and yet make money.

As now grown, mushrooms are a somewhat uncertain crop. We may have had the most extraordinary success during the last year, but may have only partial success this season, yet, so far as we know, our materials and preparations were as good, and the care the same in both cases. Now here are two points to discover: First, What caused the success? Find that out and remember it. Second, What caused the failure? Find that out too, so that in the future we may avoid it. Don't grow mushrooms unless you have a good place to grow them in. This must be under cover, be it a shed, cellar, greenhouse, stable, or the like. Don't use anything except the very best of materials, that is, good, fresh horse manure, clean sweet loam, and A1 spawn. Be exceedingly careful in the preparation of the manure, for this is the most vital

point, so far as I know, in mushroom growing. Have it moist throughout, but never wet. Prepare it under cover, safe from rain and the drying influence of sun and wind. Turn it repeatedly till its rank smell and violent heat subside, but don't let it rot up too much. Above all things don't let it burn or become "fire-fanged." Spread it out to cool and throw it together to warm up. We now use more straw in the manure than formerly because the spawn runs more readily in it; remember it should be stable-wetted, not hose-wetted, straw.

As a rule the beds are a board deep, that is seven inches of packed manure with one or two inches of loam on the top. When the beds are made up we cover them with rank straw from the manure to arrest the condensed moisture, and even after spawning and moulding over, we keep the beds still covered with hay or straw to preserve the moisture in them.

It is just as easy to grow mushrooms on a small scale for home use, as it is to grow flowers, or strawberries, or potatoes, and comparatively with no more expense; in fact, when we do the work ourselves, we don't reckon any expense, and we reap a delicious luxury for our pains.

Most market gardeners and florists make mushrooms a catch crop. Those who make it a main crop, however, are getting up special facilities for it. For instance, Mr. Charles L. Hill, of Geary street, San Francisco, who has a large fruit-canning factory some miles out of the city, has also in connection with it, what he calls a "mushroom factory," which consists of ranges of sheds filled with beds. His object in starting this mushroom place was to have something to can in winter. He came to see me last summer and told me about it. His mushroom houses are so arranged that he does the work by machinery. He loads and unloads the manure by machinery, and runs it into and out of his sheds on little railroad cars, thus very greatly reducing expenses. And as he has an abundance of steam power from his adjoining factory, his ideas of doing the mushroom work by machinery are only in embryo. Our farmers unload their hay by machinery, and why not the mushroom grower his manure? The contractor fills his gravel-cars by steam shovels, why should not the mushroom-grower turn his manure by power? F. R. Pierson & Co., of Scarborough, N. Y., have a cut flower rose-growing establishment of over fifty thousand square feet of glass, and the roses are all planted in raised

benches, in which the soil is renewed every year; this necessitates a complete removal of the old soil and introduction of fresh; but they don't use any wheelbarrows, handbarrows, or carrying boxes; they carry out the old soil and bring in fresh soil on trucks run on railroad tracks on the raised paths. These were originally made to answer the double service of footpath and railroad, thus materially reducing the cost of labor, and proportionately increasing the profits. And the like of that is what we are coming to in mushroom growing.

The Uncertainty of the Crop.— Mr. John Peck, a brick manufacturer at Haverstraw, N. Y., started mushroom growing three years ago. He happened to get a copy of the book, "Mushrooms: How to Grow Them," and it set him to thinking. He had some large underground cellars which he was not using, and could get plenty of fresh manure; so he made up seven hundred and thirty square feet of beds. His first mushrooms appeared January 18, 1892. On February 1, he made his first shipment, nine pounds, and that week he shipped sixty-three and one-half pounds. Up to June 4, he shipped from that space 1,438¾ pounds, and received from a commission merchant in New York $1,000 for his crop. He had raised two pounds to the square foot, and as this was something I never got from a bed, I looked upon his success as phenomenal, especially as he never grew a mushroom in his life before. Encouraged by such immense success, he more than doubled his area of beds last year (1892–93) and this winter he has about two thousand square feet of bed surface. In the following letter he tells us about them.

Haverstraw, N. Y., February 7, 1894.

The more I see of mushrooms the less I think I know about them. This is my third year. My first year, or rather first bed, was a grand success, but last winter I could not grow any. I did not get enough to pay for the manure. This winter, so far, I have done better, but I have not gone far enough to know as to the benefits of my present way of working. My cellars are of the ordinary style, with flat roof, but owing to the roof being double I have not been troubled by any drip. The heating is by an ordinary stove in one end, and I find no trouble in keeping a temperature of from 55° to 60° in the coldest weather.

I have two cellars, each forty-two feet long by nineteen feet wide and seven feet to the ceiling, with six ventilators in each, which I find very necessary when making up the beds, to allow the steam to escape. One bed is built on the floor and the other on a shelf, so that I have about nine hundred and eighty square feet in each cellar.

The first crop I raised, two years ago, I described in "Gardening," last April (1893), page 227, and have nothing to add to it. I have two thousand square feet in bearing since last November, and up to this date I have not cut as many pounds as I did off my cellar then referred to, with only seven hundred and thirty square feet.

Prices this year have been very poor, and there is an immense supply of mushrooms in the market. I am told that my mushrooms are as fine as any in the market, yet I have received as low as twenty-five cents per pound for them, and my average to date is only fifty cents.

John Peck.

I have here another valuable letter, from Mr. A. H. Withington, now in the orange business in Florida; but previous to this season he had been engaged, on a considerable scale, in truck gardening, berry raising, and mushroom growing at South Amboy, N. J., for the New York market. He writes me:—

Florida, February 4, 1894.

In regard to mushrooms, the average price last year was about seventy-five cents per pound, but they fluctuated from one dollar down to twenty cents per pound, according to supply and demand. We always found they sold best in February, just before Lent, and after Lent in April. Sixteen years ago I sold them as high as two dollars and fifty cents per pound, through commission merchants. I think the best way to sell them is through commission men, when one has a great many. At the same time we can get a little higher prices for the best mushrooms, from fancy fruit stores and markets. We never sold to hotels or restaurants, and didn't care for their trade.

I don't think we ever grew a pound of mushrooms that did not cost us from forty to fifty cents per pound to grow. Now, as so many have gone into their culture, lower prices must prevail. It

is just like oranges, fifty cents a box on the tree, is the prevailing price here now, and growers say they cannot produce them for that.

A. H. Withington.

Mushrooms in Summer.— The only reason why we cannot have mushrooms in summer is that they are then infested with maggots. The hot weather is not an insurmountable obstacle. The maggot is the larva of a little fly. It commences with us in April, but is not very plentiful till May; in June nothing escapes it. After August, however, it becomes less plentiful. These little flies are abundant in the open air and attack every mushroom within sight. They also get into every cellar, frame, greenhouse, and other building easily accessible from the outside, and work their mischief.

The bowels of the earth, as in caves and abandoned quarries, are inhospitable regions for this little pest, and there mushrooms can be grown in perfection in summer as well as in winter.

Mr. Abram Van Sicklin, of Long Island, has made more money in mushroom growing than any other man in America. He has been at it uninterruptedly for thirty years, but if you visit his place he will not show you his crop, nor will he ever mention it to you. Some years ago I had the temerity to ask him about his mushrooms, but the only answer I got was, "Ah, there's no money in them now. They are growing them in such quantities in abandoned slate quarries up about La Salle that we cannot compete with them in the market." But he was then, as he still is, one of the largest shippers to the New York market. At my request Mr. William Scott, of Buffalo, a keen, practical observer, who has visited the cave beds near there, has written me as follows, concerning them.

Buffalo, N. Y., February 5, 1894.

The village of Akron is about twenty miles east of Buffalo, situated on a limestone ridge. For many years immense quantities of water lime (hydraulic cement) have been manufactured there. The layer of cement rock, ranging from seven to ten feet in thickness, is in many places from twenty to thirty feet below the surface earth and useless rock; so that it is cheaper to tunnel than to remove the stone and earth that is over the limestone.

The cave I visited — belonging to a Mr. Eckerson — is the largest and most successful in mushroom production. It is perhaps fifteen or twenty acres in extent. After walking about three hundred yards (without the help of torches it would be the darkest place I was ever in), we came to the mushroom beds. Mr. Eckerson had naturally chosen a part of the cave where the roof and floor were quite dry, and for that matter, I may add, perfectly even and smooth. He had nearly three acres occupied with the beds in all stages of development — some producing, some coming in, others just spawned, and others being made up. He had some beds in ridge shape, about three feet wide at the base and two and one-half feet high, tapering to a narrow ridge at the top. These, he said, he did not like and would have no more of them. The flat beds were sixteen feet long, seven feet wide, and ten inches deep. They are all made on the rock surface, and are kept neatly in place by hemlock boards, one foot wide and sixteen feet long. The temperature of the cave would go up to 65° in summer and never fall below 58° in winter, so it is nearly uniform the whole year round. He procures his manure from neighboring towns, by the carload. It appeared to have more straw in it than is usually allowed in orthodox instructions, and it came from livery stables. I asked Mr. Eckerson what spawn he used, and he said French exclusively; he had no use for the English article. From April till October is his greatest harvest, as greenhouse mushrooms are then about useless, being wormy, and cave mushrooms have the market to themselves.

He ships them in baskets, each holding five or six pounds, and they netted him one dollar per pound the year through. New York and Chicago are his markets. I have never seen any other mushrooms like those grown in that deserted stone quarry. I believe they would weigh thirty per cent more to the bushel than any surface grown mushrooms. They were fat, juicy, rotund, solid, and immaculately white.

William Scott.

Spawn: The Amount Sold. — Three years ago, after careful inquiry, I estimated that 4,500 pounds of French spawn, and 64,000 pounds of English or brick spawn, were imported into this country annually. Since then, however, mushroom growing has increased here very greatly and the importation of spawn has augmented correspondingly — that is of the English, but not of the

French spawn. Of the English spawn, between 250,000 and 300,000 pounds a year are now imported,— more than four times as much as was used three years ago. About one-third of the whole is imported through the New York seed houses, one-third through the Philadelphia seed houses, and nearly all of the other third through the seed houses of Boston and other cities, Chicago disposing of about 10,000 pounds. Some large market-growers, like Scott & Son of Philadelphia, and the Lansdale Mushroom Co., of Pennsylvania, import their own spawn, each using a few thousand pounds.

There is an import duty of twenty per cent on spawn, but should the Wilson bill become a law, spawn will be admitted free.

To give you some idea of how the sale of mushroom spawn has increased within the last few years, let me quote from a letter from Mr. G. C. Watson, of Philadelphia: "In the season of 1888–89, when with Gardiner & Co., we sold 5,000 pounds, and the next year 50,000 pounds. I started in business for myself last May. I contracted with an English grower for 5,000 pounds. That quantity didn't begin to be enough. I have sold and shipped to date (January 31, 1894), 16,740 pounds and have a shipment of 10,000 pounds now on the way. My sales for the year may safely be put at 25,000 pounds.

American-Made Mushroom Spawn.— The manufacture of mushroom spawn in this country has never received much encouragement. Several persons have tried it, and some have succeeded in getting up a potent article; in fact, in one or two cases, samples submitted to me for trial have been as satisfactory as the imported spawn, while others have been almost or completely worthless. The best I ever grew was made and sent to me by Mr. S. Edward Paschall, of Doylestown, Pa. Indeed, my bed planted with it bore a heavier crop than did another bed alongside of it planted with English spawn. The mushrooms in both beds were the same variety. But no well-directed, persistent effort at spawn-making has come to my knowledge. All the samples that have been submitted to me for trial have had an uneven, unfinished appearance. While this would not affect the potency of the bricks at all, it certainly would spoil their sale in the market. We are now too well accustomed to the even, handsome bricks imported from England, to accept of anything rough that is made at home. In my opinion we cannot make spawn as generally good and good-

looking as the imported article and sell it as cheap. But the tendency of home growers has been to charge a higher rate for what they manufacture.

A very prominent New York seed firm report to me: "We have bought a good many pounds of homemade spawn from different parties to distribute for trial among our customers who are practical mushroom growers, who had used our imported spawn right along, but in not a single case have we had any inquiry for the domestic product."

The New Mushroom, *Agaricus subrufescens* Peck.— In the summer of 1892 I observed quantities of a rather uncouth looking, wild mushroom, new to me, growing on and about the leaf-mould piles at Dosoris. The mushrooms were not scattered about, one here and one there, as we find them in the fields, but they grew in bunches of two, three, or more, many times a dozen or two dozen growing together. But the crop was not steady; there might be a great quantity this week, barely any next week, an abundance the week following, and so on. After a rain they would spring up like magic. We had about forty loads of rotting leaves in that heap, and on forking into it found a steady, gentle heat all summer long, and that the spawn of the mushroom had run through the whole mass, over two feet deep. The best mushrooms grew in the two to three years old rotted mould. I was studying the new comer with much interest.

About that time my attention was called to the fact that a neighboring florist was picking a large quantity of mushrooms in his greenhouse and frames, and selling them in New York, getting big prices for them. I went over to see him and found the rumor to be true. But it was not the common mushroom at all that he was growing. It was the interesting stranger which I was studying in our own leaf-mould pile at home! It appeared with him the year before. He had old violet beds inside his grape and tomato house, and they were full of mushrooms; old hotbeds in his nursery were run over with mushrooms, and he had mushrooms in the open ground, among his asparagus, between rows of pear trees. They were coming up wherever planted, like a crop of weeds, in the sunshine and shade, with apparent indifference. He was picking an average of thirty-five pounds of them each day and getting from eighty to ninety cents a pound for them in New York, mostly at hotels. He had almost a monopoly of the market. He had a

bonanza, and his visions of wealth were extraordinary. He was increasing his mushroom-growing facilities proportionately with his visions and circumstances. But, alas! "The best laid schemes o' mice and men gang aft a-gley." While this mushroom has behaved with varying grace to him since then, it has not been so productive as it was the first year.

After watching its habits, and testing its quality, I sent specimens to Professor C. H. Peck, our state botanist, at Albany, for identification. He found it to be a new species and has named it *Agaricus subrufescens*. In the Annual Report of the State Botanist of the State of New York, 1893, on page 25, he gives a technical description of the species and its origin.

There is no doubt that the new mushroom has come to stay, especially as a summer cropper. But for some years at least its culture will probably be restricted to private families, and commercial growers doing a private business. Before now the price of spawn — five dollars for a five pound package — has been prohibitory, but I believe spawn will be offered this spring by one or two parties, cheap enough for every person to try it. It will be sold as flake spawn; that is, not in bricks, but in the condition in which we get French spawn, and I shall be disappointed if it costs more than a dollar per half-bushel or five dollars per barrel.

What are the advantages of the new mushroom? Its extraordinary productiveness when it does well, and its adaptability for growing in summer. In what way is it better for summer work than the old sort? We cannot control the old sort at will out of doors, or with any certainty at any time in the open air; and what we may grow in sheds, frames, or ordinary cellars are apt to be so infested with maggots as to be unfit for food. On the other hand, the new mushroom can be grown all summer, and as it springs up so fast the larvæ of the little flies do not have time to develop before the mushrooms are gathered for use. But, except for its rapid growth, the new mushroom is no more maggot-proof than the old one.

What are the disadvantages of the new mushroom? Its toadstool appearance; its uncertain behavior; and the fact that its crop comes in spurts,— plenty today and maybe none tomorrow. But further personal acquaintance may overcome the objection to its looks, and practical experience may correct its behavior. Bulk for bulk it is not as heavy as is the common mushroom; while its

cap is deeper and broader, it is thinner, and hence lighter. Although it does not burst its veil as soon as the other kind, it gets old very quickly after its veil is burst.

Is it good to eat? Yes, very. It has a pronounced mushroom flavor; exudes a fair quantity of juice and the flesh is tender. I know several persons who prefer it to the common mushroom; but for my part, I am still inclined to favor my old and toothsome friend *A. campestris*.

The best method of cultivation of the new mushroom is not yet properly understood. That it requires more heat than the old mushroom is generally conceded; also that it needs more water. By repeated practical experiment, it has been proven that it grows as well in winter as in summer, provided that the cultural conditions are favorable to its development. It will also grow in a cellar of Egyptian darkness as well as in the daylight. In fact, darkness whitens the mushrooms and takes away much of their outdoor coarseness.

The lavish success that we have had with it at one time, and the perfect failure at another, when apparently under the same conditions, convince me that there are vital points in its cultivation that we do not yet understand. Sometimes we may plant a bed with the spawn; in four or five weeks mushrooms begin to appear, and in two months from planting we have an enormous crop. Then again we may plant another bed in the same way; the spawn runs in it as prettily and thoroughly as in the other, completely permeating the whole mass of manure; but it does not bear a mushroom; as yet we do not know why. What shall we do with such a bed? Take it out to a warm, dry, airy shed or loft and spread it out to dry. It will make first-rate spawn, and the probabilities are that the next bed you make up and plant with this spawn will produce a heavy crop of mushrooms.

Under date of January 31, last, Mr. Ferdinand Boulon, the florist who grew it so successfully in 1892, wrote me:

"Under my control the new mushroom has grown at all times in the year, but I find that it is more productive in summer than in winter. In winter, after one picking, we have to wait ten to fifteen days for another picking. In summer the crop is more regular. It is a good acquisition for summer use. The *Agaricus campestris* cannot be grown well in summer on account of the maggot, but *A. subrufescens* grows so quickly that the maggot has

no time to develop in it. Its cultivation is very easy and it needs very little care. If one does not wish to make a special bed for it he can plant the spawn between early cucumbers, or melons, or other early crops under glass."

Writing to me last September, Mr. William H. Daniels, a florist and mushroom grower of Mamaroneck, N. Y., told me that he had made up two beds, each sixty feet long by two and one-half feet wide, and planted them with the new mushroom. The manure was just right. About two weeks after planting, the spawn had run through the beds, appearing like a thick film at every crack between the bottom boards. Then he moulded them over with loam, and otherwise treated them like the common mushroom. In due time they came into bearing, the young mushrooms appearing all over the beds. When about one-fourth grown growth ceased and they stood like that for three or four days. Something was lacking. Then he thought of water and gave the bed a good soaking; the result was that the mushrooms swelled up splendidly and he had an immense crop.

He made up succession beds and February 2 he wrote again: "I have not yet gathered a mushroom of the new variety this winter. I made up a bed in my violet house and spawned one-half of it with the common mushroom, and the other half with the new mushroom. I am now gathering plenty of the common variety, but not one of the new variety, although the bed is a solid mass of spawn. I had an idea when I spawned the bed that the house would not be warm enough for the new mushroom, but concluded to try it.

"I sold some of the spawn of the new mushroom to a private gardener near me and advised him to put it in a warm house, which he did. The result with him has been a grand crop. I saw his bed about two weeks ago and it was a picture then. He told me that he had been picking from it for over eight weeks and was delighted with it. After the success I had with it last summer I shall certainly grow it again next summer. I do not think it is quite as good for shipping as *A. campestris*, but for home trade, gathered when fresh open, my customers tell me that it is superior in quality to the old mushroom."

I wrote to Mr. Daniels asking him for particulars as to how his neighbor grew the mushroom. Under date of February 8, he kindly replied, as follows:

"Today I paid a visit to the gardener I told you about, to obtain from him the secret of his success. He laughed at the word 'secret' and said he had no secret about it. The only thing was the hint I gave him about putting it in his warmest house. He made up his bed about one foot deep under the hot water pipes but concluded to box it in, as he thought the heat from the pipes would dry out the bed too much; otherwise the bed was made up and spawned exactly as for *A. campestris*. 'A great cropper!' was his exclamation. He said he was never without mushrooms from that bed for eleven weeks. The manure in the bed was only at 75° when he planted the spawn, but it kept at that heat a good while. He estimates that although it takes a greater bulk of the new mushroom to weigh a pound than it does of the old one, he gets more than three pounds of the new mushroom to one of the old sort, from the same space of bed. Now he declares that while he can get spawn of *A. subrufescens* he will never go back to *A. campestris*.

One thing which he especially likes about this new variety is, that if the bed is dry on the top, a light watering with a rose-pot does not injure the young mushrooms, but rather benefits them, whereas with the old variety it is generally injurious to the young pin heads.

In the fall of 1892 I gave a barrel of this natural spawn to Mr. Griffin of Westbury, who cultivates mushrooms extensively for market, in capacious cellars under his barns, heating with hot water. In the winter of 1892–93 he planted some beds with this spawn, but did not get any mushrooms from them. The beds, however, were a complete mass of spawn, so he took them out and dried the spawn for future use. Last fall he again made up and planted some beds with this spawn. He has had immense success, the mushrooms coming up in great clumps or basketfuls. He wrote to me about them and I sent Mr. Lendel Hallock, of Queens, to try to get a photograph of them, but on account of the narrowness of the pathways in the cellar, with the beds placed one above another, and other complications, he could not get a photograph either by flash-light or otherwise. Messrs. Griffin and Hallock took a clump, growing in a space of two feet by one foot, slipped it into a flat, and carried it out of doors to have its picture taken. It contained ninety-one mushrooms, large and small, which weighed six and one-half pounds. The mushrooms were two days too old,

and the caps had become wide spread and darkened with spores. This was because he had kept them, without picking, for me to see.

Under date of January 30, Mr. Griffin wrote me: "I would very much like to have you see the new mushroom; there is no doubt about its being a fine cropper and easy to grow — indeed, more so than the other variety, under just the same treatment. I have a lot here that we are eating every day, for I am sorry to say that it does not take in the market; in fact, before I knew it, it had spoiled several shipments for me, as I packed them with the other, so we have to eat them ourselves now."

Mr. Griffin's bed that is now in bearing is built on the ground, right under the hot water pipes. After the beds were spawned the atmospheric temperature was kept up to nearly 70°, but as soon as the young mushrooms appeared it was lowered to 60°. All of the beds, till they came into bearing, were kept covered with a thick layer of rank straw shaken out of the manure. When bearing begins this covering is removed, except a light scattering which neither prevents the mushrooms from coming up, nor obstructs one in gathering them, yet keeps the surface of the ground quite moist.

The expression "spoiling his shipments," may need explanation. He ships altogether to commission men. They do not want, and will not handle, any mushroom except the old variety, because their customers will not take any other, so when Mr. Griffin's mixed lots reached them, they picked out and threw away all of the new mushroom, retaining and paying for the old variety only.

The new mushroom with its whitish gills, pale, lemon-tinted neck, and thick, furry veil, has a good deal of the toadstool look about it, and since the "mushroom poisoning" scare of last summer, especially, the people look with distrust upon everything in this line except the genuine *A. campestris*.

Discussion.

John M. Kinney said that he had had large experience with wild mushrooms, especially *Boletus*, which grow in enormous quantities in Plymouth County. In that part of Massachusetts there is an area of three hundred square miles of pine forest, in which these fungi grow in great abundance. A boy can go out for them, and in an afternoon can gather five hundred pounds, at a cost of about one cent per pound. Mr. Kinney had used about a ton in a

season, making them into a table sauce which he considered better than the much praised Worcestershire brand.

Mr. —— Clark stated that in the Annual Report of the United States Department of Agriculture, for 1890, the Chief of the Division of Microscopy gave a list of edible and poisonous mushrooms found in the United States, with directions for the culture of the edible species, and various methods of cooking them.

Mrs. H. L. T. Wolcott said that at one time she had an experience of beginning in mushroom culture. She prepared a bed which made satisfactory progress until, just as it was about to be a success, floods came and ruined the whole plant. She had some experience in cooking mushrooms taken from an elm tree stump. Frequently, rumors of cases of poisoning will create a popular scare, and many people are thus made afraid to use any kind of mushroom. In every such case of course many tons of this food will mature and go to waste.

Joseph H. Woodford gave the following recipe for cooking mushrooms: Take off the skin from the top and brush the dirt off the stalk. Cut half through the stalk near the gills so it can be laid on a gridiron, as broiling is the best way to cook it; let it broil until it can be easily punctured with a sharp fork. Meanwhile, have a good porter-house steak broiled, and serve the two together. They will assimilate most satisfactorily.

Jackson Dawson did not consider the porter-house steak an always necessary accompaniment. After carefully brushing the dirt from the stems, and taking off the skins from the tops of the mushrooms, he cuts off the stems, which are stewed until tender. Sufficient bread is toasted and buttered, and spread upon a platter and the stewed stems are poured over it. The tops, which have been broiled, meanwhile, are also served with the other portion.

Samuel Merrill remarked that when the supply was unlimited, he preferred to have mushrooms broiled, but if only a limited amount can be had, it is more economical to stew them. Field mushrooms will give a rich flavor to milk or cream; in this case, a quite liberal quantity of milk may be used, with some butter, and a small amount of flour for thickening, and the mixture seasoned to suit the taste. The mushrooms are to be broken into small pieces and put into the milk, and it should be stirred constantly while it is being cooked. It should be left on the fire only one or two minutes after it reaches the boiling point. If cream is used

no butter will be necessary. If the mushrooms are large and fresh and the supply adequate, he would broil them. He regarded *Agaricus comatus* (the Shaggy Maned) as the best, except *A. campestris*. It requires about twenty minutes to cook the stems, but only ten minutes for the caps. He had never found them infested with maggots. Where the *A. comatus* grow at all, they grow profusely, crowded together. They are found in filled land, in the suburbs of cities, and often on or near disreputable looking rubbish heaps.

Professor Benjamin M. Watson, Jr., said that an easy rule for cooking mushrooms is, to put into a blazer two large spoonfuls of butter for each pound of mushrooms; then put in the mushrooms, gills upward, and add salt and pepper as the taste requires. Let them stew until cooked. Just before the cooking is completed, a spoonful of sherry or a gill of cream may be added. They should be served on hot, buttered toast. *Agaricus campestris* can be easily distinguished by the color of the gills, which, when fresh, are of a beautiful pink color. Another distinction is its location, which is always in grassy places, in fields and rich pastures, but never in woods or damp ground. Every one should know, however, that there are many poisonous mushrooms, some of which will make one sick, while others will cause death.

A lady asked how one could distinguish the poisonous species and varieties; also if any sources of information were readily accessible.

Professor Watson advised, as the best method of learning how to distinguish the edible from the poisonous mushrooms, to get some one who knows these plants to take a walk in the fields and woods with you, and show you the characteristics peculiar to each variety; also to read authoritative papers upon the subject, especially those that are illustrated faithfully, such as are published in the Annual Reports of the United States Department of Agriculture, and the articles written by Professor William G. Farlow, of Harvard University, that have been coming out in "Garden and Forest," and are now published in pamphlet form. This plan will be all the more successful if the paper or the book is taken into the field or forest, and read when a specimen is found. The study of the natural object is far preferable to the best picture that can be made.

Mr. Kinney remarked that if any cooked *Boletus edulis*, *B. bovinus*, etc., either broiled or stewed, be left over, they can, after they become cold, be chopped fine, and be added to an omelet; or, if simply mixed with beaten eggs and cooked, they will make most delicious dishes. An Italian cook once brought to him a dish of square-flat macaroni, stuffed with mushrooms, cheese, and various sweet herbs. He found it to be a most excellent combination. If mushrooms are carefully cleaned, peeled, sliced vertically, dried properly, and stored in a dry cool place, they may be taken out later, at any time, soaked until swollen to the natural size, and then cooked the same as if freshly gathered, when they will be found nearly as delicious as are those just from the beds. Mr. Kinney then referred to the question as to the best treatise to assist a novice in identifying wholesome mushrooms, and mentioned Julius A. Palmer, Jr.'s book, "About Mushrooms," published by Lee & Shepard, as one of the best guides. He said that early in his experience in mushroom hunting he took some fine specimens to Mr. Palmer for identification. Mr. Palmer at once said they were *Boletus bovinus;* a perfectly wholesome variety. The speaker once heard this direction given, "If you find a mushroom that you think is edible, but have some doubts about it, you might eat one today, and, if you don't hear from it, disagreeably, eat two tomorrow." He once yielded to this temptation, and "heard from it," by its causing a quite troublesome eruption upon his face for a time. Mushrooms are of value as a source of an excellent vinegar. In one season, when at Wareham, Mr. Kinney made seven barrels of mushroom vinegar to be used mostly in the preparation of mushroom table-sauce, referred to in his remarks at the opening of this discussion. The acid of this vinegar is not acetic acid as in cider vinegar, but the vinegar is considered equally wholesome by many, and some prefer it to cider vinegar, as it retains considerable of the fine flavor of mushrooms, which makes them so popular when served freshly cooked. This vinegar also holds its good qualities the same as cider vinegar.

Mr. —— Stein said he had been through an experience somewhat similar to that suggested by Mr. Kinney. He had received no harm as yet, except in one instance; then he suspected that his indulgence in strange mushrooms had caused his discomfort. He looked over his "Encyclopedia Britannica," and concluded he had all the symptoms of such poisoning; but he had survived it all.

He added that he would like to hear a full lecture on the distinctions between the edible and the poisonous mushrooms, in order to be thoroughly informed.

Mr. Falconer replied to a question about the cost of the spawn of the new mushroom, that five dollars for five pounds of the spawn had been the price until now; but he believed it would be offered for less than five dollars a barrel during the present year. Referring to the points of distinction between edible and poisonous mushrooms, he said that a toadstool that is eaten by slugs is probably edible. He added that he had a big maltese cat, which is as fond of cooked mushrooms as of meat. He also stated that he made it a point never to wet a mushroom after gathering it; if any dirt gets into the gills, it is nearly impossible to get it out. In cooking mushrooms, care must be taken not to cook them too long. If the juice is dried out in that way, it lessens the good quality of the viand.

Miss —— Jones stated that those who sold dried mushrooms in Italy were obliged to get a license before offering their goods for sale.

Mr. Merrill spoke of similarities of the edible and poisonous mushrooms. Some edible varieties have white spores; but the Deadly Amanita — *Agaricus* (*Amanita*) *vernus* — is also white in all its parts. The Puff-ball — *Lycoperdon giganteum* — when in condition to be eaten is entirely white; when gone to seed it is like a bag filled with dark colored dust, the spores. When fresh it is not only wholesome food, but delicious; there is no poisonous variety. To prepare it, the skin must be peeled off; the flesh, which is pure white like cream cheese, is to be sliced and cooked in batter. The taste resembles that of an omelet.

Mr. Falconer mentioned the Fairy Ring champignon — *Marasmius oreades* — as another species of the edible mushrooms. It is represented as one of the most highly flavored. Another gentleman present cordially indorsed this statement, having eaten very many of them with much enjoyment.

Mr. Kinney, while riding in Franklin Park with a friend, discovered a Giant Puff-ball — *Lycoperdon giganteum* — that was larger than the crown of his hat. He carried it to Young's Hotel, and showed it to the manager present, who thought the monster fungus was poisonous. Mr. Kinney proposed that it be taken to the *chef de cuisine* and his opinion learned. This was done,

and that official pronounced it very fine. It was served at dinner the next day, and the manager reported later that it was delicious.

The subject announced for the next Saturday was "Cinerarias and Calceolarias," by Kenneth Finlayson, Brookline.

A desire having been expressed at the meeting that the receipts for cooking mushrooms at the close of Mr. Falconer's book, "Mushrooms: How to Grow Them," should be printed in connection with this discussion, they are here presented.

COOKING MUSHROOMS.

Baked Mushrooms.— Peel and stem the mushrooms, rub and sprinkle a little salt on the gills, and lay the mushrooms, gills up, on a shallow baking tin and put a small piece of butter on each mushroom. Place an inverted saucer or deep plate over them in the tin, and put them in a brisk oven for twenty minutes. Then take them out and serve upon hot plates, without spilling any of the juice that has collected in the middle of each mushroom.

Stewed Mushrooms.—Peel and stem the mushrooms. Take an enameled saucepan, put a lump of butter in it and melt it; then put in the mushrooms, and season with salt and pepper and a small piece of pounded mace (if you like it); then cover the saucepan tightly and stew the mushrooms gently until they are tender, which will be in about half an hour. Have ready some toast, either dry or fried in butter, as preferred, spread out upon a hot dish, place the mushrooms upon the toast with the gills uppermost, pour the juice over them and serve hot.

Stewed Mushrooms.— Peel and stem them; then dip them in water containing lemon juice (this is to prevent their becoming dark-colored in cooking, or giving a dark color to the stew) and drain them dry. Put them into a a stewpan, with a good-sized lump of butter and some nice gravy, and let them stew about ten minutes. Take a little stock or cream, beat up some flour in it quite smooth, and add a little lemon juice and grated nutmeg. Add this to the mushrooms and cook briskly for about ten minutes longer or until tender.

Soyer's Breakfast Mushrooms.— Place some freshly made toast, divided, on a dish, and put the mushrooms, stemmed and peeled, gills upward, upon it; add a little pepper and salt and put a small bit of butter in the middle of each mushroom. Pour a teaspoonful of cream over each, and add one clove for the whole dish. Put an inverted basin over the whole. Bake for twenty or twenty-five minutes, and do not remove the basin until the dish is brought to the table, so as to preserve the grateful aroma.

Mushrooms à la Crême.— Peel and stew the mushrooms; roll a lump of butter in flour and put it into the saucepan; then add the mushrooms and some salt, white pepper, a little sugar and finely chopped parsley. Stew for ten minutes. Take the yolks of two eggs beaten up with two large spoonfuls of cream, and add the mixture gradually to the stew; cook for a few minutes longer and serve hot.

Curried Mushrooms.— Peel and stew a pound of mushrooms, sprinkle with salt, add a little butter, and stew gently for fifteen or twenty minutes in a little good stock or gravy. Then add four tablespoonfuls of cream, and one teaspoonful of good curry powder, previously well mixed with two teaspoonfuls of wheat flour. Mix carefully and cook for five or ten minutes longer, and serve hot on hot plates.

Broiled Mushrooms.— Select large, open, fresh mushrooms, stem and peel them. Put them on the gridiron, stem side down, over a bright but not very hot fire, and cook for three minutes. Then turn them, put a small piece of butter in the middle of each and broil for about ten minutes longer. Put them in hot plates, gills upward, and place another small piece of butter on each mushroom, together with a little pepper and salt, and flavor with lemon juice or Chili vinegar, and put them into the oven for a minute or two; then serve.

Mushroom Soup.— Take a quantity of fresh young mushrooms, stem and peel them. Stew them with a little butter, pepper, and salt, and some good stock, till tender; take them out and chop them up quite small; prepare a good stock, as for any other soup, and add it to the mushrooms and the liquor they have been cooked in. Boil all together and serve. If white soup is required use white button mushrooms and a good veal stock, adding a spoonful of cream or a little milk, as the color may require. If the mushrooms are very young they have but little flavor; if they are full grown they darken the soup, and if they are brown in the gills when used, the soup will be disagreeably dark. If, after preparing, but before cooking, the mushrooms, you pour over them some boiling water into which a little vinegar or lemon juice has been dropped, and then drain them off through a colander, you can prevent, to a great extent, their darkening influence on the soup, but always at the expense of their flavor.

Mushroom Stems.— The stems of fresh young mushrooms are excellent to eat, but those of old or stale mushrooms are unfit for food. In the case of plump, fresh, full-sized mushrooms, the upper part of the stem, that is, the portion between the frill and the socket in the cap, is used. Any part of the stem that is tough or discolored or woody, should be rejected. The stems are excellent for ketchup or flavoring or as a sauce with boiled fowl.

Potted Mushrooms.— Select nice button, or unopen, mushrooms, and to a quart of these add three ounces of fresh butter, and stew gently in an enameled saucepan, shaking them frequently to prevent burning. After a few minutes dust a little finely powdered salt, a little spice, and a few grains of cayenne over them, and stew until tender. When cooked turn them into a colander standing in a basin, and leave them there until cold; then press them into small potting-jars, and fill up the jars with warm clarified butter and cover with paper, tied down and brushed over with melted suet to exclude the air. Keep in a cool, dry place. The gravy can be used for flavoring other gravies, etc.

Gilbert's Breakfast Mushrooms.— Get half grown mushrooms, peel them and place one layer, gills-side upward, on a pie plate; put a small piece of butter on each; pepper and salt to taste; add two tablespoonfuls of

ketchup and one of water; press round the rim of the plate a strip of paste; cover with another plate of the same size pressed firmly in the paste; put the whole in a brisk oven for twenty-five minutes. The top plate should be left on until served.

Baked Mushrooms.— (A breakfast, luncheon, or supper dish.) For this mode of cooking, mushroom flaps are better than buttons, and should not be too large. Cut off a portion of the stalk from sixteen mushrooms, peel the tops, wipe them off with a piece of flannel and a little fine salt. Put them into a tin baking dish, with a very small piece of butter placed on each mushroom; sprinkle over them a little pepper, and let them bake twenty minutes, or longer should the mushrooms be very large. Have ready a very hot dish, pile the mushrooms high in the centre, pour the gravy round, and send them to the table quickly on very hot plates.

Broiled Mushrooms.— (A breakfast, luncheon, or supper dish.) Cleanse the mushrooms by wiping them with a piece of flannel and a little salt; cut off a portion of the stalk and peel the tops; broil them over a clear fire, turning them once, and arrange them on a very hot dish. Put a small piece of butter on each mushroom, season with pepper and salt, and squeeze over them a few drops of lemon juice. Place the dish before the fire, and when the butter is melted serve very hot and quickly. Moderate sized flaps are better suited for this mode of cooking than are the buttons.

Mushrooms à la Casse, Tout.— Cut a round of bread one-half an inch thick, and toast it nicely; butter it both sides and place it on a clean baking sheet or tin; cleanse the mushrooms as in the preceding recipe, and place them on the toast, head downwards; lightly pepper and salt them, and place a piece of butter the size of a nut on each mushroom; cover them with a finger glass and let them cook close to the fire for ten or twelve minutes. Slip the toast into a hot dish, but do not remove the glass cover until they are on the table. All the aroma and flavor of the mushrooms are preserved by this method. In winter the glass dish should be rinsed in warm water before using, and with moderate care it will not crack.

Stewed Mushrooms.— Ingredients: One pint of mushroom buttons, three ounces of fresh butter, white pepper and salt to taste, lemon juice, one teaspoonful of flour, cream, or milk, one-fourth teaspoonful of grated nutmeg. Mode: Cut off the ends of the stalks and pare neatly a pint of mushroom buttons; put them, as they are done, into a basin of water with a little lemon juice. When all are prepared take them from the water with the hands, to avoid the sediment, and put them into a stewpan with the fresh butter, white pepper, salt, and the juice of one-half a lemon; cover the pan closely and let the mushrooms stew from twenty to twenty-five minutes, then thicken the butter with the above proportion of flour; add, gradually, sufficient cream, or cream and milk, to make the sauce of a proper consistency, and put in the nutmeg. If the mushrooms are not perfectly tender stew them five minutes longer, remove every particle of butter which may be floating on the top, and serve.

Broiled Beefsteak and Mushrooms.— Ingredients: Two or three dozen small button mushrooms, one ounce of butter, one tablespoonful of mush-

room ketchup, salt and cayenne to taste. Mode: Wipe the mushrooms free from grit with a piece of flannel and salt; put them in a stewpan with the butter, ketchup, and seasoning; stir over the fire until the mushrooms are quite done. Have the steak nicely broiled, and pour over it the mushroom sauce. The above is equally good with stewed steak.

To Preserve Mushrooms.— Ingredients: To each quart of mushrooms allow three ounces of butter, the juice of one lemon, salt and pepper to taste; also some clarified butter. Mode: Peel the mushrooms; put them into cold water and a little lemon juice; take them out of the water and dry them very carefully in a cloth. Put the butter into a stewpan capable of holding the mushrooms; when it is melted add the mushrooms, lemon juice, and a seasoning of salt and pepper; put them over a slow fire, and let them remain until their liquor is boiled away and they have become quite dry, but be careful in not allowing them to stick to the bottom of the stewpan. When done put them into pots and pour over the top the clarified butter. If for immediate use, they will keep good a few days without the covering of butter. When needed later, put them into a stewpan to warm, then strain off the butter, and they will be ready for use.

Mushroom Powder.— (A valuable addition to sauces and gravies, when fresh mushrooms are not obtainable.) Ingredients: One-half peck of large mushrooms, two onions, twelve cloves, one-fourth ounce of pounded mace, two teaspoonfuls of white pepper. Mode: Peel the mushrooms, wipe them perfectly free from grit and dirt, remove the black fur, and reject all those that are at all worm-eaten. Put them into a stewpan with the other named ingredients, but without water, and shake them over a clear fire till all the liquor is dried up, being careful not to let them burn. Then arrange them on tins and dry them in a slow oven. When ready, pound them to a fine powder, which should be put into small dry bottles, tightly corked, and sealed, and kept in a dry place. In using this powder, add it to the gravy just before serving, when it will require one boil up. It should be made in September or at the beginning of October. If the bottles used are not perfectly dry, the powder will speedily deteriorate.

Mushroom Powder.— This is for use as a condiment. The finest, full-grown mushrooms should be selected and prepared for drying, and dried as directed under the heading, "Dried Mushrooms," although it is better to dry them in an oven or drying machine, so that they may be dried quickly, and become brittle. Grate, or otherwise reduce them to a fine powder, and preserve it in tightly corked bottles.

To Dry Mushrooms.— Wipe them clean, take away the brown part and peel off the skin; lay them on sheets of paper to dry in a cool oven, when they will shrivel considerably. Keep them in paper bags, which should hang in a dry place. When wanted for use put them into cold gravy and bring them gradually to a simmer, and it will be found that they will regain nearly their usual size.

Dried Mushrooms.—In the flush of the pasture-mushroom season, gather a large number of mushrooms of all sizes, and see that they are thoroughly clean. Remove and discard the stems and peel the caps. Stir them round

for a few minutes in boiling water, to which a little lemon juice or vinegar has been added, to prevent them from turning dark colored. Some people use plain cold water, or cold water with lemon juice or vinegar in it. But never use salt in preparing mushrooms for drying, as salted mushrooms will absorb moisture from the atmosphere and soon spoil. Take the mushrooms out of the water and drain them on a sieve; then string them and hang them up to dry and season, in an open, airy shed, as one would do with strings of drying fruit. They may also be dried in a drying machine or oven, as is done with apples or peaches. They are used as a substitute for fresh mushrooms when the latter cannot be obtained. In preparing dried mushrooms for use, steep them in tepid water or milk until they become quite soft and plump, then drain them dry and cook them the same ways as fresh mushrooms.

Mushroom Ketchup.— To each peck of mushrooms add one-half pound of salt; to each quart of mushroom liquor add one-half ounce of allspice, one-half ounce of ginger, two blades of pounded mace, and one-fourth ounce of cayenne. Choose full-grown mushroom flaps, and be careful that they are perfectly fresh-gathered, when the weather is tolerably dry; for if they are picked during rain the ketchup made from them is liable to get musty and will not keep long. Put a layer of them in a deep pan, sprinkle salt over them, then another layer of mushrooms and salt as before, and so on alternately. Let them remain a few hours, and break them up with the hand; put them in a cool place for three days, occasionally stirring and mashing them well to extract from them as much juice as possible. Measure the quantity without straining, and to each quart allow the named proportions of spices, etc. Put all into a stone jar, cover it closely, place it in a deep pan of boiling water, set it over the fire and let it boil for three hours. Have ready a clean stewpan; turn into it the contents of the jar, and let it simmer very gently for half an hour. Pour it into a pitcher, where it should stand in a cool place until the next day; then pour it off into another pitcher and strain it into very dry, clean bottles, and do not squeeze the mushrooms. To each pint of the ketchup add a few drops of brandy. Be careful not to shake the ketchup when pouring it into the bottles, but leave all sediment in the pitcher; cork well, and either seal or rosin the cork, so as to exclude the air perfectly. When a very clear, bright ketchup is wanted, the liquor must be strained through a very fine hair sieve or flannel bag after it has been very gently poured off, and if this operation is not successful it must be repeated until you have quite a clear liquor. It should be examined occasionally, and if it is spoiling should be reboiled with a few peppercorns. It may be made any time from the first of September to the middle of October.

Mushroom Ketchup.— This flavoring ingredient, if genuine and well prepared, is one of the most useful store sauces to the experienced cook, and no trouble should be spared in its preparation. Double ketchup is made by boiling down each quart to one pint. This goes further than ordinary ketchup, as so little is required to flavor a good quantity of gravy. The sediment may also be bottled for immediate use in flavoring thick soups or gravies.

Mushroom Ketchup.— In making ketchup use the very best mushrooms, full grown, but young and fresh, as it is highly important to secure fine flavor, and this we cannot get from inferior mushrooms. Take a measure of fine fresh mushrooms and see that they are clean and free from grit; stem and peel them; cut them into very thin slices and place a layer of these on the bottom of a deep dish or tureen; sprinkle this layer with fine salt; then put in another layer and sprinkle with salt as before, and so on until the dish is full. The white succulent part of the stems may be used in the ketchup, but never any of the discolored, tough, or stringy part. On the top of all strew a layer of fresh walnut rind cut into small pieces. Place the dish in a cool cellar for four or five days, to allow the contents to macerate. When the whole mass has become nearly liquid pass it through a colander. Then boil down the strained liquor to half of its bulk and add its own weight of calf's-foot jelly; season with allspice or white pepper and boil down to the consistence of jelly. Pour into stoneware jars and keep in a cool place.

Pickled Mushrooms.— Ingredients: To each quart of mushrooms allow two blades of pounded mace, one ounce of ground pepper, salt to taste, and sufficient vinegar to cover the mushrooms. Choose young button mushrooms for pickling; rub off the skin with a piece of flannel and salt, and cut off the stalks; if very large, take out the red gills, and reject the black ones, as they are too old. Put them in a stewpan, sprinkle salt over them, with pounded mace and pepper in the above proportions; shake them well over a clear fire until the liquor flows, and keep them there until it is all dried up again; then add as much vinegar as will cover them, let it simmer one minute and store it away in stone jars for use. When cold, tie down with bladder and keep in a dry place. They will remain good for a long time, and are generally considered delicious. Make this the same time as ketchup, from the first of September to the middle of October.

MEETING FOR DISCUSSION.

Saturday, February 24, 1894.

A Meeting for Discussion was holden today at eleven o'clock, the President, Nathaniel T. Kidder, in the chair. The following paper was read by the author.

Cinerarias and Calceolarias.

By Kenneth Finlayson, Brookline.

The march of improvement in the Cineraria, is as conspicuously great as in any other class of plants, and when we compare the best types of the florists' varieties of today with the old species —

Cineraria cruenta, from the Canary Islands, introduced into England in 1777, and supposed to be the progenitor of the present varieties,— the contrast is truly remarkable; thanks to the indomitable will and perseverance of the skillful hybridist.

Today we have in the best types, plants of compact form with immense flowers, frequently measuring three inches in diameter and sometimes more. The best flowers are a perfect circle in outline, the petals broad and overlapping each other, and the colors varying in endless shades of self and combinations. Yet it is singular that — so far as I know — there is not a true yellow variety to be seen in all our garden varieties. This is the more remarkable when we reflect on the fact that quite a number of the species of this genus are yellow. In my mind, a good yellow cineraria would be a great acquisition.

Dame Nature seems to have fixed laws, whereby we are apparently unable to get certain colors in some species of plants. Whether this law be real or only apparent I am not prepared to decide, though I am free to say that I think even the most skillful hybridist is not so well informed in regard to manipulating colors to the end of obtaining a desired tint or shade, as he is in selecting any other points for the accomplishment of a certain end. Therefore more knowledge in producing colors in plants may in time, to a certain extent at least, dissipate from our minds this idea of the apparently impossible in this direction.

A case in point. It has been thought that no other color than white could be produced in the calla lily; but we have now not only a yellow calla, but a pink one as well, so we are told.

This noble calling of ours then, is by no means exhausted in any one branch of its infinite ramifications.

The cineraria is eminently well suited for the decoration of the cool greenhouse and conservatory, its bright and gorgeous colors arresting the attention at once. There are very few individual plants of any kind, of equal size, that compare with it for a blaze of showiness. But for a house plant it is a very indifferent subject; the gas and heat of the dwelling-house will destroy it in a very short time. However, where there is a large bay-window, or a similar structure attached to a dwelling-house, in which plants are kept, the cineraria will do well. For cutting purposes it is not well adapted, on account of the flower spikes being stiff and formal, and also because it wilts quickly in warm rooms.

We will now consider the cineraria from a cultural standpoint, and this may be of more interest to the novices present than anything else I may say regarding it, and to them this paper is addressed. In so doing I shall give my own cultural methods, since they are more familiar to me.

Propagation.— Cinerarias are propagated by seeds or cuttings, but the latter method is seldom resorted to, especially in this country. It was practised more or less extensively in England, and other European countries some years ago, for the purpose of perpetuating good varieties which appeared from time to time. Good varieties in those days were less frequent than they are nowadays; consequently the practice is dying out, and in no way can it be recommended, except for the purposes that gave it birth, and then only when something extraordinarily good appears. It is impossible to grow as large a plant in the same period of time from a cutting as from a seed; hence the folly of the practice.

The best seeds ought always to be purchased as it is as easy to grow good strains of all kinds of plants as bad ones, and it is infinitely more pleasing to enjoy their superior excellence after growing them.

In order to be justified at any time in blowing up, by dynamite or otherwise, the retailing seedsman or seed firm and all concerned, for furnishing seeds inferior to what was supposed to have been purchased, we must make our own efforts toward perfection in all the details that tend to bring out all that is good in a plant or strain of plants.

An inferior article is indelibly so under the best cultural care; a good article, on the other hand, will show itself under the most indifferent cultural care.

For large and early flowering plants, the seeds should be sown sometime in the latter part of May or early in June, in earthen pans or wooden boxes, four inches deep, the size depending on the quantity of seed to be sown. These pans or boxes should be well drained by broken crocks, or any other hard material that will serve that purpose; over the drainage put a thin layer of sphagnum moss to prevent the soil from entering the drainage.

The chief aims in preparing the soil used at this initial stage are lightness and porosity and to secure these, leaf-mould and clean sharp sand must be used in equal quantities, with an additional fraction of fibrous loam. The pans or boxes having been filled

within about an inch of the top with this soil, and made level and smooth, proceed to sow the seeds evenly all over the surface. Cover them lightly a little more than their own depth; press gently with a smooth board; then water with a fine spray-rose and put a pane of glass over the top of each pan to check evaporation.

Consign the pans to a frame, to prevent draughts more than anything. The seeds will soon germinate in such a place; therefore be watchful, and as soon as they make their appearance well above the soil, remove the glass from the pans in order that they may not become drawn.

Should the pans in which they germinated be at some distance from the glass, they can now be taken out and put on a shelf near the light, but not in a place where the sun will strike them, for cinerarias will not stand bright sunshine; it would mean instant destruction for them at this early stage of their existence. As soon as the seedlings are strong enough to handle, prick them out an inch or more apart, in other boxes, diminishing a trifle the proportion of sand in the soil and increasing the loam. They can now be transferred to cold frames outside, but must be guarded against violent draughts and changes of the weather.

The best position for the frames in which the plants are to be grown during the summer season is in a northern exposure; that is, the higher side of the frame should face south and the lower side north. Should circumstances furnish a high board fence, or still better a high wall, as an additional shade, so that the sun could not at any time shine on the plants, that would be the ideal position for the frames, not only for cinerarias but for a large number of other plants; all other shading over the glass could then be dispensed with. But such a position is seldom offered even on large estates, therefore we must solve the problem the next best way, and that is by painting the glass of the frame with a thin coat of white lead mixed with turpentine or kerosene; oil makes the lead stick to the glass too hard, thereby giving considerable trouble in washing it off again.

In addition to this thin coat of paint, have lath shades made, of the same size as the sashes, for they are much easier to handle. The frame work of these shades should be of one inch square stock, with end pieces to connect the sides, and a further piece of the same stock to run diagonally between opposite corners; this will make a strong and durable frame on which to nail the laths.

The laths should be nailed across the width, and not lengthwise of the framework.

The laths should be of half-inch stock and one inch wide, leaving a space of half an inch between the laths. When finished, paint them one or two coats, and you will have neat and durable shades that will last many years. They are also the best shades for many other purposes.

Presuming now that the seedlings are in boxes under this carefully prepared canopy, they will make rapid progress in growth. In a very short time they can be transferred from the boxes to three-inch pots, returning them to the frames thereafter and plunging them in coal ashes, or any other loose material, up to the rims of the pots. Coal ashes is preferable on account of its porosity and as a barrier to earthworms.

The soil at this potting may have a further addition of loam, and a corresponding decrease of sand, with a small quantity of well decayed cow manure or sheep manure added.

All that is necessary now for a while is shading, watering, and syringing overhead at least once a day on hot, bright days; preferably in the evening after the sun has passed entirely away from them. This operation is chiefly to furnish the necessary moisture in the bed, to keep down thrip and red spider, and to furnish to the leaves the equivalent of moisture that has been evaporated from them during the day. There is another enemy that is exceedingly partial to the cineraria, and that is the green fly, which must be looked after with the utmost vigilance. While the plants are growing in frames the best way to combat this pest is to chop tobacco stems and strew them all over the surface of the bed to a considerable thickness, renewing them at intervals to insure their destroying effect.

The usually very hot and dry atmosphere during the latter part of June, and until the middle of August is a severe handicap for any rapid growth. This is the only time that cinerarias can be considered as difficult to grow, for in spite of all care, some of them are likely to perish. After the middle of August it is comparatively easy sailing for the cultivator, and instead of being at his wit's end, to keep them living and healthy, he will now be at his wit's end to keep them successfully provided with pot room; for be it understood that, like many other plants of a rapidly growing nature, cinerarias should not become pot-bound until they are finally established in their flowering pots.

The proper size must be determined by each grower, and it depends upon the purposes for which he wants the plants. A good commercial size I consider to be a seven-inch pot; for show and exhibition purposes I should choose eight-inch and nine-inch pots; the latter being sufficiently large for very large plants. A size larger than this I should not consider advisable to adopt, unless I was desirous to produce something with which to astonish spectators.

Returning once more to our plants in three-inch pots: all the plants that are strong and healthy, and have filled their pots with roots, can be transferred to pots two sizes larger at each successive potting thereafter; this is the limit I give to the novice. The professional can go a size larger, that is from a three-inch to a six-inch pot, and from a six-inch to a nine-inch pot, and so on. Much tact as well as knowledge is required in the watering of plants after such ample shifts. On no account can this extreme latitude in potting be extended to any other than rapidly growing plants.

Soil.—The soil can now be considered at length, and on a more comprehensive scale, since at this stage of growth it is to play the most important part. What is the best soil for potting plants? may be asked.

To that question I would reply that for any and all plants requiring soil to grow them in, the chief component of all soils should, with few exceptions, be composted sods from grass pastures that have been out of tillage for a considerable period of time. If I had my own choice of a place for sod cutting, I would invariably select the hollows in the pastures, as the best sod for potting purposes is found there. The soil is always deeper and richer in such places, the best particles of the surrounding elevations being washed down there by rains in the progress of time, some localities of course furnishing richer soil than others. I cut these sods of the same thickness as those used for sodding, and lay them up in square piles, grass-face downward; first three layers of the sods; then a layer of fresh cow manure, free from straw or any other litter. I continue in this manner until I think I have enough in the piles to last me a year or more. If it is left in this pile for a twelvemonth before using it will be the better, as it will become more mellow in that time, and the nitrogen and other fertilizing substances in the manure will become thoroughly incorporated with the loam.

We have now the chief component of all potting soils, with the few exceptions before mentioned, and made of the very best material. All that is necessary to be added at the potting operation is leaf-mould and sharp, clean sand, in such proportions as the nature of the plants to be potted dictates.

The loam pile should be chopped with a pickaxe or spade, preparatory to using it, the fineness of the chopping depending on the nature of the plants to be potted, but never too finely chopped or screened. Add the other ingredients, if any, mix thoroughly, and let it lie over for a month before using. During this rest the soil will go through a process of fermentation, thereby sweetening it. All who can practise this method should do so, as it is undoubtedly the best.

I pot my cinerarias finally in soil composed chiefly of the first composition, adding to a barrowful of loam, a six-inch potful of pulverized sheep manure, a ten-inch potful of leaf-mould and two ordinary shovelfuls of sand.

Assuming now that we are in the month of October, and the plants in their flowering pots, do not plunge them more than one-third their depth in the plunging material. As the nights are increasing in length, and the sun's power is less strong, evaporation is consequently less rapid, and anything that causes excess of moisture around the plants will tend to make them spindling. Admit considerable of the morning and afternoon sun now to build up a stocky and sturdy constitution.

Habit.— The best strains are naturally stocky and, as a rule, will form shapely plants without much training on the part of the cultivator. But amongst the best strains there is a large percentage that show unruliness by throwing the leading flower-head up to a considerable height above the foliage, thereby impairing the beauty of the plant. This bad habit ought to be corrected as soon as a plant shows a tendency in that direction, by nipping out the central flower-spike, thus enabling the lateral flower-spikes to assume their proper rank, as they will almost invariably do, rising to a uniform height above the foliage and forming a broad, dense head.

The plants ought to be taken into the greenhouse any time in November, for early flowering, which will commence in January, or earlier if desired.

The proper night temperature in winter ranges from forty to forty-five degrees; and on bright sunny days from fifty-five to sixty degrees, with an abundance of air whenever the weather permits. In such a temperature and with such treatment I have found them do exceedingly well, and remain so clean from insect pests that I seldom have had occasion to fumigate them more than once during the winter.

Stimulants.— Cinerarias are gross feeders and will take an abundance of plant food after the pots are well filled with roots. If given once or twice a week it will not by any means hurt them, provided it is not too strong and the weather is bright.

The most satisfactory results have been obtained, in my own experience, with guano or guano and soot mixed half-and-half. The soot tends to intensify the color. I take as much guano as I can grasp conveniently in my hand, which is equivalent to two heaping tablespoonfuls, dissolve it in six gallons of water, and water the plants with it at that strength; this rule holds good with the soot and guano.

Cow manure liquid is very good as a stimulant, and can be used freely. Standen's Fertilizer is excellent, but it is not readily dissolved in water like some other fertilizers; it is better therefore to spread it over the surface of the earth in the pots, as when in contact with the earth it will dissolve gradually. A teaspoonful is sufficient at one time to surface a ten- or twelve-inch pot. It is better to repeat oftener than to give too large a dose at once.

Calceolarias.— I would state that the cultural treatment of the calceolaria is similar to that of the cineraria in almost every particular.

The former, however, as a rule is not sown until about the first of August, and, the seeds being much smaller, the plants, in their earlier stages, require more attention from the grower in order to be successful with them.

They are even more impatient of high temperatures than the cineraria. They require the coolest and shadiest position to germinate freely. They are also more sensitive to bright sunlight, and must therefore be well shaded during sunny weather. They must always, whether in frames or greenhouses, be kept close to the glass to encourage a sturdy and stocky growth.

The green aphis, being particularly partial to this plant, must be kept in check at all times; it will attack the under side of the

leaf, and, increasing very rapidly, will do considerable injury before its presence is discovered; therefore we must examine the underside of the leaves frequently. The strewing of chopped tobacco stems in quantities around the pots is the best way to ward off this enemy. Calceolarias require an abundance of water until well grown; but as little moisture as possible should be tolerated on the benches, when they are in full flower, otherwise the flowers will get spotted very quickly. Shading is very necessary when they are in flower, their beauty being thereby preserved to double the time it would otherwise continue.

A vast deal more could be said in regard to cultural and other details in connection with these two plants, but in view of your possible weariness over the subject, I deem it best to stop.

Discussion.

Mr. Finlayson brought with him several cineraria plants in pots. Some of them had few, but rather long and straggling branches; they had been supplied with all needed plant food, water, heat, light, and ventilation, and had been protected from all insect pests. These plants, he said, showed their natural habit of growth, as they had not been nipped, cut back, or otherwise pruned. He then brought forward other plants, which he said were of the same age as those first shown, and had received the same treatment in all respects mentioned, except that these had been judiciously nipped early, and whenever it was judged necessary. This treatment caused them to throw out more branches, which were shorter than those on the nature-trained plants, but were more stocky, and the plants were more symmetrical. They would also produce more flowers than could be grown on the other plants. He next showed a plant in bloom, saying that it had been nipped back twice, which made it a shapely and good plant, and that the variety was a good one. He called attention to another flower which he condemned as a poor one, as he could see through it between the petals. If the flowers are zoned, the zones should be well defined, as all colors should be when more than one occurs in a flower. One plant bore flowers in which the central or disk florets were yellow, making a fine contrast with the crimson ray florets or so-called petals. He said that the plants shown were all seedlings.

In reply to a question as to the probable color of flowers on seedlings from the seeds which grew in one capsule or seed

receptacle, Mr. Finlayson could not say that one would get the same color as the parent flower, but sometimes they are thus reproduced. The central or disk florets are perfect flowers, but the ray florets are all of but one sex.

Plants are never used a second season. They cannot be grafted successfully; even if the union of scion and stock could be effected, the stem is so brittle that a very light wind would be liable to break it at the junction.

Regarding the possibility of growing cinerarias in a north-east shady corner, Mr. Finlayson thought it could probably be done, but he doubted the advisability of a trial, as the result would generally be far from satisfactory.

The announcement for the next Saturday was a paper on "Some Insects Injurious to Vegetation," by John G. Jack, of the Arnold Arboretum, Jamaica Plain.

BUSINESS MEETING.

Saturday, March 3, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, Vice President Francis H. Appleton in the chair.

A letter from C. J. Pennock, Secretary of the American Carnation Society, was read, accepting the offer, by this Society, of one of its halls for the meeting of the American Carnation Society in February, 1895.

Frederick A. Blake, of Rochdale, was proposed by O. B. Hadwen, as an Annual Member of the Society.

The following named persons, having been recommended by the Executive Committee, were on ballot duly elected members of the Society:

Philip A. Chase, of Lynn,
John C. Cobb, of Milton,
Col. William L. Chase, of Brookline,
Augustus H. Kelley, of East Boston,
Charles A. Loring, of Reading,
Marshall F. Ewell, of Marshfield Hills.

The meeting was then dissolved.

MEETING FOR DISCUSSION.

Notes on Some Injurious Insects.

By John G. Jack, Arnold Arboretum, Jamaica Plain.

The subject of injurious insects is so broad and many sided, that it is not easy to select particular points for a short review, without seeming to neglect others equally important; because every person naturally regards those insects which attack his particular plants or crops as deserving of the most attention.

The ravages of some species of insects appeal to, and directly or indirectly affect, almost everybody over a wide area; as in the cases of the Potato Beetle (*Doryphora decem-lineata*), and the Tent Caterpillar (*Clisiocampa Americana* and *C. sylvatica*). The different species of insects which derive their sustenance from plants may be numbered by tens of thousands in North America and Europe; but very few of them are likely to attract the attention of people who are not entomologists. In the United States, for instance, there are recorded more than five hundred kinds of insects which feed upon the oaks, and there are undoubtedly hundreds of others which have not been studied.

While we have many kinds of insects which may be called standard pests, or which are pretty constantly abundant and injurious to certain plants, we can never be sure from what quarter a new depredator may appear, or what hitherto healthy plant may be afflicted with an enemy not recognized as previously affecting, or seriously injuring it.

It sometimes happens that an insect, once considered rare, suddenly becomes conspicuously abundant and destructive for a season, or longer, and then it may almost entirely disappear from notice for an indefinite time. An insect hitherto regarded as common, may become a great rarity, or even extinct.

The commonly injurious insects may, in the course of nature, be much lessened for a time, by various agencies. The *Clisiocampa Americana* or Tent Caterpillars of early summer, for instance, hatch from the eggs very early in the spring, and the young larvæ may be largely destroyed by late frosts, or a period of cold, wet weather. An almost complete cessation of injuries by a species of borer, which was destroying immense numbers of conifers in the forests of West Virginia a year or two ago, is only accounted

for by the severity of the preceding winter which, it is supposed, killed the insects.

Certain kinds of birds are fond of particular species of insects, and if a large flock of these should pass through an infested region at the proper time, a great diminution of that special insect pest would be the natural result.

Predatory insects and natural parasites are great aids in preventing the too great increase of injurious species, sometimes waging a war almost of extermination against them. Occasionally bacterial or fungal diseases may cause widespread destruction among insect tribes, as well as among higher animals.

Sometimes we find one species of insect supplanting another which had much the same habit and fed on similar plants. The common White, or Cabbage, Butterfly (*Pieris rapæ*), was first landed from Europe, at Quebec, and as it has spread southward and westward, the native white butterflies have become quite rare in many regions. The imported Cabbage Butterfly itself is not so abundant and destructive as it was at first, because its numbers have been greatly reduced by a minute parasitic fly which has followed it.

In recent years the ravages of insects have become more and and more noticeable, and have necessarily received greater attention from cultivators. The destruction of the native wild plants upon which indigenous insects originally fed; the increased areas under cultivation, and the consequent abundance of food supply of certain kinds; the improvement and diversity of cultivated plants — are all factors which have constantly tended to attract insects from their native waste places and woods, to our gardens, field crops, and orchards. Very often, as our population has increased, certain kinds of valuable insect eating birds and other animals have become scarcer.

With active immigration and importation, we must expect also to receive and naturalize more species of those insects which are natives of, and are troublesome in, other countries.

Among the most conspicuous of such immigrants already settled among us, and now well known in the different branches of horticulture and agriculture, we have the Codling Moth (*Carpocapsa pomonella*), the Oyster-shell Bark-louse (*Mytilaspis pomorum*), affecting the apple and other allied fruits; the Fluted Scale (*Icerya Purchasi*), destructive to trees of the Citrus group, and others, in

California; the imported Currant-borer (*Ægeria tipuliformis*), and the Currant-worm (*Nematus ventricosus*), affecting both red currants and gooseberries; the Asparagus Beetle (*Crioceris asparagi*); the Gypsy Moth (*Ocneria dispar*), and the Leopard Moth (*Zeuzera pyrina*), which has got a foothold in New Jersey, and is destructive to elms by boring into the branches.

Our orchid growers received the Cattleya Fly (*Isosoma orchideārum*) through importation, and within a few years cattle raisers have become familiar with the Horn Fly (*Hæmatobia serrata*), which is spreading over the country.

In these notes I intend to refer chiefly to a number of insects, mostly very common, about which I am most often questioned by residents of this vicinity.

Those insects which, instead of feeding externally, pass the most mischievous time of their lives in boring within the tissues of plants, offer one of the most difficult classes to deal with and keep in subjection, if once allowed to become abundant. In order to combat them with best results the life history of each species should be known. After they have entered and begun boring in the wood or stem of the plant, it is rarely possible to get at them with insecticides. Probing for the larvæ in the stems, or cutting out the affected parts, remain as cures. But, if possible, we should anticipate the disease by destroying the adult insects, before their eggs are laid, or otherwise prevent their deposition of eggs. Besides the direct injury to the plant by borers, the holes made by them are openings for the entrance of destructive fungi and disease-laden moisture.

One of the most notable and troublesome of these tree destroying pests, is the Locust Borer (*Cyllene Robiniæ*), which makes it a difficult matter to grow the valuable and beautiful locusts or Robinias in some localities. The trunks and larger branches of trees are sometimes so thoroughly honeycombed by these borers that they are liable to break off in any strong wind. If we carefully examine the bark in the latter part of August and during September, we are likely to find these handsome, brown and yellow banded, wasp-like beetles laying oval, dull white eggs, in crevices in the bark, and especially about old wounds.

These eggs hatch in a week or two and the young larvæ eat their way into the bark and towards the interior. They are yet

quite small when winter overtakes them, during which season they remain dormant. With the return of warm weather they renew their boring operations, and increase rapidly in size until about the beginning of August, when they cease feeding and enter the pupal stage. A week or two after this they emerge as beetles from their burrows in the wood. Thus they complete the cycle of their existence in just a year.

The beetles are particularly fond of golden rod and some other yellow flowers, and they should be killed whenever found. They are easily captured, and should be collected from the bark of the trees they infest. The aim should be to prevent egg-laying. This may best be accomplished by giving the trunks and larger branches a thorough and heavy washing of soap. There are many ways by which fairly efficient washes may be made, and different ingredients may be added; but the following formula, proposed by Dr. Charles V. Riley, may be taken as a good standard, for a soap to be applied to the trunks of trees to prevent the inroads of borers.

Potash lye, one pound; fish oil, three pints; soft water, two gallons. Dissolve the lye in the water, and when brought to the boiling point, add the oil, and boil the whole about two hours. Water is added to make up the evaporation by boiling, and the result will be, twenty-five pounds of soft soap, which will make from fifty to one hundred gallons of trunk wash, according to the amount of dilution. The application of the wash should be most thorough, so that it shall enter well into the crevices of the bark. In this region it should be applied about the 20th of August, and again in two or three weeks, if much washed by rains. It is particularly important that the trees should be looked after when young.

The young branches of the locusts are subject to serious injury from another borer, the larva of a small moth (*Ecdytolopha insiticiana*). This insect causes a swelling of the part of the twig affected, and an examination in summer will show that it is hollow and inhabited by a small white larva, which becomes fully grown and leaves the twig at the end of summer, and usually forms its chrysalis on the ground. The best remedy which can be suggested is to cut off these branches below the parts affected, and destroy them with their contained larvæ. This work must be done in summer when the swollen parts are green and fresh and

the larvæ are in them; otherwise it will be labor wasted. The trees are rapid growers and will soon recover from a necessarily vigorous pruning. If care is taken to taken to cut and burn all the infested twigs in any locality, there will very likely follow a period of comparative freedom from injury.

Complaints are often made of destruction of the ornamental mountain ash, hawthorns, and apple trees, by the Round-headed Apple Tree Borer (*Saperda candida*). This insect most commonly attacks the lower part of the trunks, at or near the ground. The egg-laying takes place in June and July, and it is at that time that the trunks should be covered with the soft soap wash, if there is any danger of attack.

It is said that this insect does not complete its growth, and reach the perfect, or beetle, stage until the third year from the time the egg is laid. Throughout this period it remains in the wood, actively boring during the growing seasons. The greatest danger to the life of the tree is caused while the insect is boring in the sapwood, and before it goes deeper into the trunk; because the tree may thus become practically girdled and killed, as the sapwood is the most vital part, being the medium through which the sap is conducted from the roots to the branches and foliage.

The presence of the borers may often be detected by the fine sawdust-like material thrown out from cracks in the bark, and the well-known practice of reaching after and destroying them with a flexible wire may be tried. In thin-barked trees, when the borers are at work directly under the bark, they usually cause a drying and discoloration of it, and the larvæ may thus be located and cut out. The pale brown and white striped beetles of this species are not often seen, because they usually move about in the dusk, and remain quiet during the day.

The opposite of this habit is seen in the beetle of the Flat-headed Apple Tree Borer (*Chrysobothris femorata*), which delights to bask in the sunshine on the bark of the trees; but the color of the insect harmonizes so well with the general color of the bark, that it is not easily detected. This species is often more common than the other, and does more widespread injury. As the name indicates, the boring larva has a broad flattened head, and a comparatively slender body.

It rarely attacks well established, vigorous, perfectly healthy trees, but prefers those of feeble growth, or which are already

injured. It is very liable to attack young, newly transplanted trees, which may be girdled in a single season. Ingress is often afforded where branches have been cut off and the wounds are not thoroughly covered. It reaches full development within a year from the time the egg is laid.

The use of soap wash, to prevent the successful laying of the eggs, is the best protection. It should be applied with particular care, about all wounds or scars, and in the forks of the large branches. Young, newly planted trees should be especially attended to, in all localities where there is any trouble from this pest. The application of the wash at the same season will serve against both the Round-headed and the Flat-headed borers, but in treating for the former, the soap should be applied very close to the ground, or even a little below the surface, scraping away a little of the loose soil for that purpose and replacing it afterward.

The same preventives and remedies can be applied for a large proportion of the kinds of borers which injure the stems and branches of our trees and shrubs. The damage is done by the insects while in the state of grubs or larvæ, which are hatched from eggs that are usually deposited upon or within the bark; and the best mode of controlling them is to prevent their entrance. In applying washes to the bark, we should know the habits of the parent insects, and especially at what season their eggs are deposited, because any washes applied at the wrong time will do little or no good.

Sometimes the stems of plants may be so fully infested that it would be better to cut and burn them while all the insects are within. In the Arnold Arboretum the stems of the native willows, of many species, have recently become greatly infested by an imported beetle (*Cryptorhynchus lapathi*) belonging to the curculio family. This insect may give great trouble to willow growers, and as willows grow easily and rapidly from cuttings or from the stumps, it may be that our best remedy will be found in cutting down and burning all infested parts of the plants while the pests are within them.

Borers in small branches and twigs are sometimes troublesome. The Oak Pruner (*Elaphidion villosum*), for instance, often causes small branches of oak, apple, and other trees to break off and fall to the ground in the autumn and winter. As the larvæ remain in the twigs all winter, they are easily destroyed by collecting and burning the detached branches.

Many insects, which cause the curious abnormal growths known as galls, remain in these habitations during the winter, and, if troublesome, they may be cut off at this season and burned. The large moss-like growths on sweet-brier and some other roses, are familiar examples.

While the largest number of species of injurious borers belong to the beetle family, we have also a good many moths whose larvæ are borers and thus do much damage to the trunks and branches of trees.

The ravages of the Peach Tree Borer (*Ægeria exitiosa*) are only too well known in many localities. The perfect insect is a moth, which flies in the daytime, and has a wasp-like aspect. In midsummer, the female deposits her eggs on the bark, generally near the surface of the ground. As soon as hatched the young larvæ proceed to bore inwards and downwards, and usually their presence may be detected by free exudations of gum.

A heavy wash of soap is a good preventive of egg deposit, but it should be applied two or three inches below the surface as well as above ground.

Where the borers already exist, an effective remedy has been found in removing some of the soil from the base of the tree, forming a little hollow and filling it with boiling hot water. The larvæ will be killed and the tree not hurt.

This suggests the practicability, in exceptional cases, of killing other borers, higher in the trunks of smooth barked trees, by winding a piece of waterproof cloth around the affected part of the trunk, the upper end open and somewhat flaring, and the lower tightly bound about the bark. Filling this with very hot water for a moment or two, would destroy borers otherwise hardly accessible. A drop of kerosene will always kill borers, if it can be forced into the holes so as to come in contact with the insects.

The upper portions of the roots, near the bases of the stems of blackberry and of our common clematis or virgin's bower, have, in this region often been found infested by the boring larvæ of two species of day-flying moths (*Bembecia marginata* and *Acalthœ caudata*). Very good remedies may be found in scraping away some of the soil, and giving the infested parts a good dose of boiling water, or a heavy watering of kerosene emulsion.

Larvæ of such insects as the Codling Moth (*Carpocapsa pomonella*) and Plum Curculio (*Conotrachelus nenuphar*), are, in

a certain sense, borers, and the application of insecticides can be only partially successful.

Recent experiments have shown that some value may be attached to arsenical remedies if applied at the proper times. The eggs of the Codling Moth are laid on the surface of the fruit, usually about the calyx lobes, and the young larva may take enough of the poison to kill it before it succeeds in eating into the apple, where it would be safe. On the other hand the Plum Curculio deposits its eggs within punctures or holes which it makes in the flesh of the fruit, so that its grubs are generally out of the reach of poisons. But as the beetles bite into the fruit for the purpose of oviposition, and also feed upon the young fruit and foliage, they may themselves take enough of the insecticide to prove fatal.

The Plum Curculio is not merely an enemy to the culture of plums, cherries, and other stone fruits; if neglected it may become very destructive to such fruits as apples and quinces. During the past summer I saw an orchard in which hundreds of bushels of apples, chiefly of the Oldenburg variety, were ruined by this insect, either by the beetles depositing their eggs in the young fruit, or by the grubs living within it, or by the beetles biting holes on the surface of the apples as they neared maturity, and thus destroying their commercial value. As this orchard is in the vicinity of many long-neglected plum trees, where curculios have prevented the perfecting of any fruit, it may be that they have been forced to seek other food than their first choice, and in this case we have another example of the evil of neglect.

In combating both Codling Moth and Plum Curculio, it is an excellent practice at once to collect and destroy all diseased fruit as soon as it falls; also all infested fruit seen while the larvæ are within it.

A peculiar class of borers consists of those usually very small species which mine or tunnel within the parenchyma, or between the upper and lower surfaces of the leaves. These little insects are not often very troublesome in this region, but occasionally they cause much annoyance. Their depredations usually appear in the form of blotches, or irregular, gradually enlarging lines through the leaves.

The locust leaves are very commonly much injured by large, whitish blotches which are the mines of a beetle (*Hispa suturalis*). Many persons in the vicinity of Boston have noticed the ugly,

dark blotches, which have sometimes appeared in the handsome foliage of the tulip trees, caused by larvæ of a small, mosquito-like fly (*Cecidomyia liriodendri*). At the Arnold Arboretum and other places, alders have been annually stripped of most of their leaves by the larvæ of a small sawfly (*Fenusa varipes*), which have been so numerous as to completely clean out the interior of the leaves, leaving only the dry skeletons and skins, which wither and fall in midsummer.

Pale colored lines, sometimes zigzag and irregular — sometimes following the margins or veins of the leaves, are often found on cinerarias, eupatoriums, Paris daisies or marguerites, and similar plants in the garden and greenhouse. These are caused by the larvæ of very small, dark gray flies, which live within the leaves. Infested leaves should be removed and destroyed whenever seen, or if the leaves are few and not badly injured, and it is desirable to retain them, they may be held up to the light, when the little larvæ can be easily seen at the ends of their tunnels, and crushed.

These pests have sometimes done much damage to the foliage of cinerarias, eupatoriums, and other composite plants in greenhouses in this region. They are liable to affect chrysanthemum leaves. Leaf-mining insects, being secure from insecticides, are not easily dealt with. Hand-picking and burning of the infested leaves is the usual remedy advised.

The foliage eaters among insects probably attract the most general attention. In this part of the country there are three or four species better known than all others. These are within fairly easy control and it is due to our own carelessness if we allow them to increase to a very injurious degree. It would seem as though their habits must be too well known to require mention, but numerous questionings show how little they are understood.

The Tent Caterpillar (*Clisiocampa Americana*), so common in spring and early summer, may be easily located by the tent-like web in which the caterpillars live when not out feeding. They may be found in their webs in the early and late parts of the day, and on cool cloudy days, and are then most easily destroyed. During the warm part of the day they may be scattered on the foliage; then collecting them is more difficult and uncertain.

In midsummer the moths deposit their rings of eggs on the small twigs, upon which they remain until they hatch in the following spring. These rings of eggs are fairly large, and sufficiently con-

spicuous to be readily seen and removed in winter; thus much labor may be saved for the busy months of spring and early summer. In Newton and some other neighboring towns this practice has been encouraged; children have been taught to become quite interested in the work, and, so employed, spend many hours out of doors in healthy, useful exercise. As a boy, in my father's orchard, I have frequently, as the result of my efforts during a school holiday, collected four hundred or five hundred rings, each of which, if left to hatch, would mean a web with several hundred caterpillars. As a reward for my industry, I was paid a cent a dozen for the rings.

Apple pickers should be told to remove the rings whenever seen. As the insects are partial to the Black and Choke Cherries, these should also be examined and all the eggs that are found should be destroyed.

I understand that a committee has been appointed by this Society to see to the "extermination of the Tent Caterpillars." As these insects extend from Canada to Texas and from Maine to California it will be seen that the committee has a long and hard task before it.

In July and August there appear other tent-building caterpillars which are very different from the earlier kind, both in appearance and habits. These are known as the Fall Web-worms (*Hyphantria cunea*). The moths of this species are of a milk-white color, with or without a few black dots on the wings. They deposit their eggs in broad patches, on the under sides of the leaves, about the end of May or in June. The caterpillars become fully grown at the end of summer, or in early autumn; then go to the ground to pupate and reappear as moths in the next spring and early summer. Farther south, there are two broods of this insect in the year. From their habits it will be seen at once, that egg collecting is not practicable, and that the insect can best be controlled by the removal of the webs and caterpillars whenever seen. Until they are almost fully grown the caterpillars will always be found within or about their webs. The moths also should be killed whenever found. This species seems most partial to Poplars, Willows, Elms, and some Maples; but they commonly affect a great variety of shade trees, fruit trees, and shrubs.

The Canker-worms (*Anisopteryx vernata* and *A. pometaria*), which, besides other plants, particularly affect our elm and apple

trees, have probably received as much attention in Boston and vicinity as in any part of the country. Yet the value of the well-known tar-coated or ink-coated bands, placed on the trunks of the trees, is but little understood, and complaints are often made of their inefficiency. This worm is one of the easiest to control of all our insect pests; the chief requisites being the proper banding of the trunks at the right season, and care to keep the tar or ink coating in good effective condition.

The female canker-worm moths are wingless. The larvæ (known also as loopers, inch-worms, or measuring-worms, from their manner of locomotion) drop or crawl to the ground to pupate, and when the moths emerge they must creep up the trunk of the tree in order to deposit their eggs on the branches, where they are usually placed. A proper band will keep every female moth from ascending. Bands of printer's ink, six inches or more in width, applied directly on the bark, or upon stout cloth or other material, are most commonly employed, and are quite as efficient as the much more expensive oil troughs occasionally used. The object is to prevent the wingless females from ascending, by entrapping them in the sticky substance. The moths ascend both in the late autumn and in spring; therefore, in order to keep all from passing over the bands, these must be kept in a moist and sticky condition from the last of October until hard frosts in December, and again in early spring until no moths are to be found climbing the trees. An unusually mild period in winter may induce some of the moths to come out, and in such an event the bands should be freshly coated. It is also well to keep the bands sticky until after apple blossoming time, so that any young larvæ, which may have hatched from eggs deposited below the bands, will not be able to ascend.

Besides printer's ink, any sticky substance may be used which does not dry too quickly. Among such substances may be mentioned tar, mixed with oil to prevent too quick drying; slow drying varnishes; the German preparation known as Insect Lime, and even thick refuse molasses. When the substance is applied on a band of cloth or other material it is very important that no large, open crevices remain on the bark beneath; tow, or cotton batting, will be found a good filling. No contiguous trees should remain unprotected.

The Tussock Moth (*Orgyia leucostigma*), so familiar to everyone in the habit of crossing Boston Common in summer, is another insect easily within control of those who are willing to take a little care of their trees. The female moth of this species is wingless, like that of the canker worm, but its caterpillar, instead of going to the ground to form its chrysalis, goes through all of its transformations on the tree. The caterpillar usually makes its dull gray cocoon on the bark of the trunks or branches. When the female moths emerge from the chrysalids they deposit their eggs in a mass upon the cocoons from which they came. These cocoons and the whitish egg-masses are readily seen, and if they were collected in winter and destroyed, we should have no further trouble with this pest.

There are ten or a dozen known species of parasites which prey upon this insect. As the cocoons which produce the male moths bear no eggs they need not be gathered; in fact all non-egg-bearing cocoons might be left as likely to harbor parasites of the Tussock Moth, and these parasites are valuable allies in keeping the numbers of caterpillars in check. If unskilled labor is employed, or the presence of the cocoons is objectionable, it may be found best and most economical to remove all, regardless of the parasites, which would have no work left if the trees were thoroughly cleared; moreover, parasites are common among other kinds of insects, so that there is no danger of their extermination.

Nearly every season, we, in Boston, hear complaints of the damage by caterpillars to the Japanese Ampelopsis or "ivy," now so much used in covering buildings. These caterpillars are usually of a pale bluish color, with slender black lines, and an orange colored band across each segment. The larvæ are often so abundant as to strip the plants of most or all of their leaves. They also feed upon American Ampelopsis or woodbine, and the species of grape. They are the caterpillars of handsome, velvety, blue-black, day-flying moths (*Alypia octomaculata*), which expand about an inch and a quarter across the wings; have two, large, pale yellow spots on each front wing, and two white spots on each hind wing. Besides flying about the food plant of their young, these moths may be seen on the flowers of the mountain ashes, *Deutzia gracilis*, and other blossoms, in our gardens in early summer. It would be well to catch and destroy them whenever seen. On limited areas the caterpillars may be picked by hand,

but where insecticides must be used, spraying with a mixture composed of about a teaspoonful of Paris Green in two gallons of water, is effectual. Hellebore also, either as a powder, or in water, is said to be efficient, and it has the advantage of not being so dangerous to persons or foliage.

The larch or tamarack is a favorite among many tree growers in this part of the country, and it has been much planted for shade, ornament, and utility. Within the past few years we have often heard complaints of the destruction of the foliage by little greenish white larvæ. The trees are commonly stripped of their leaves by midsummer, and their beauty is quite destroyed. They are rarely killed however, as they have the power of readily sending out a new supply of leaves; but their growth is much retarded and their aspect somewhat changed by frequent attacks.

These insects are the larvæ of little sawflies (*Nematus Erichsonii*), which deposit their eggs in rows in the tender young twigs and cause those parts of the twigs bearing eggs to bend to the side in which they are laid. They do not appear to have attracted attention here until about 1880, although they were probably present long before. They attack both European and American larches, usually appearing in large numbers and accomplishing their work rapidly. It is a difficult matter to control this pest on large trees, but, if applicable, almost any of the insecticides will prove effective. The insect belongs to the same group as the Currant-worm, so easily controlled by hellebore. The cocoons, with pupæ, are to be found under the trees in autumn and spring, and if all debris was raked up and burned, or the ground trampled by cattle, great numbers of them would be destroyed.

Aphides and plant-bugs form a class of plant pests which are difficult to keep in subjection. This is partly because of the very rapid development and prolific reproduction, of certain species, and because of their peculiar adaptation for taking nutrition from the plants, without eating any of the plant tissues. These insects are without regular jaws or mouth parts, but in place of these are provided with beaks for sucking liquid food, from either plants or animals, after the manner of the mosquito. It is on this account that the ordinary insect poisons are often useless when applied against them, for the ends of their beaks being within the plant tissue, they take none of the poison with their food.

A most efficient remedy remaining is found in suffocation, which may be accomplished by the use of oils, tobacco smoke, or irritants like pyrethrum powder. Like other insects these breathe through numerous small openings or spiracles, generally situated along the sides of their bodies, and it is by closing or irritating their breathing organs, and thus practically causing suffocation, that kerosene emulsion, whale oil soap, and other allied insecticides prove effective. It must be remembered, however, that these remedies are often of little use against the more active, stronger insects, and are most effectual when applied against those which are weak, sluggish, or soft.

The young terminal shoots of many shrubs and young trees are often stunted and made to grow in unnatural, bushy forms, by little greenish bugs or hoppers of various species, which puncture and suck the sap from the leaves and tender stems and cause these distortions. The annual growth of young maples, lindens, locusts and other trees are often thus checked from several inches to a foot or two, and the lateral buds are crowded in large numbers near together around the twigs, resulting in injury to the appearance, value, and development of the tree.

Little green and red banded hoppers, commonly but erroneously called "Thrips", suck the sap from grape leaves, causing them to become spotted and dry; a small green species is sometimes so plentiful on rose bushes as to cause the leaves to dry and fall on account of the constant piercing and loss of sap.

The disease of chrysanthemums which causes the young growths to become bunched and impairs the flowering value of the plant — causing it to become "blind" as some cultivators express it — is probably mostly due to injuries of the same nature.

In their winged state, many of the little bugs which cause this mischief take alarm and fly away so quickly that they are scarcely seen; if the young are on the plants they conceal themselves if possible.

Frequent and thorough spraying with a strong decoction of tobacco and soap, or the use of kerosene emulsion, and the dipping of infested branches into the emulsion, will be found valuable in lessening the injuries on small trees, shrubs, and other plants. Covering small plants and fumigating with tobacco is effective. Good results will also be obtained by dusting with fresh pyrethrum powder, or tobacco dust; these remedies are clean and easily applied. But, as many of these insects feed upon grass and other

herbage, fresh supplies of the pests may be constantly on hand, unless such plants as the chrysanthemums are well isolated.

A large net made of fine mesh mosquito netting, drawn quickly around and among the plants, will capture great numbers of the winged insects. If chrysanthemums were protected by gauze covered frames, there should be no trouble from the pests.

Scale Insects and Mealy Bugs obtain their food by sucking the sap of plants through beaks, in the same manner as the Aphides and the true bugs. The different species vary so much in habit that no rule is applicable to many of them together. From delicate plants, and when the scales are mature, it is often necessary to remove the pest by hand. On strong plants, especially woody species, the stems and branches may be washed with whale oil soap or kerosene emulsion with good effect. In this work a knowledge of the habits of the species to be combatted will prove of the greatest advantage. For instance, we find that the Oyster-shell Bark-louse (*Mytilaspis pomorum*), of the apple and other fruit trees, hatches from the egg and begins life as a little, active, light-colored louse, in the latter part of May or in June, and this is by far the best time to attack it. At this time sprayings of ordinary kerosene emulsion would destroy every louse with which it came in contact. Later, the insects become fixed on the bark, from which they never afterwards move, and as the season advances they become protected by the well-known scaly covering, which offers a considerable resistance to insecticides.

Nuthatches, chickadees, woodpeckers of several species, and some other birds, do a vast amount of little appreciated benefit by clearing off the scale insects which infest the trunks and branches of trees and shrubs. I have often watched winter birds at this work.

An inconspicuous insect, but one which often gives a great deal of trouble to gardeners, is Fuller's Rose Beetle (*Aramigus Fulleri*), a small beetle of the curculio family. The principal damage is done in its larval stages, when the little white grubs live in the soil and feed upon the roots of many kinds of plants. Cultivators in Boston and vicinity have frequently called my attention to this troublesome pest. Sometimes the roots have been eaten from whole beds of primroses in the open air; in winter the enemy may be damaging the roots of roses in the greenhouse. The beetle is so much like the average soil in color, that it generally escapes

notice. It may often be found eating the foliage of plants in the greenhouse, and it should be destroyed whenever seen. Sometimes the damage is done by another and larger curculio (*Otiorhynchus sulcatus*) while in its stage of a small white grub. The beetles of both species are active only at night; in the daytime they are usually quiet and may be found on the ground or clinging to twigs or the under side of leaves.

Every summer, in many parts of New England, we hear complaints of the destruction of the grass of lawns by the white grubs or larvæ, of the May Beetles or June Bugs (*Lachnosterna fusca*), which live in the soil and eat the roots. Often the grass gets brown in patches, and is found to have all its roots cut away. Few of the remedies usually recommended can be called convenient or practicable.

Experiments conducted at Washington some years ago showed that white grubs of another species (*Allorhina nitida*), having a habit of feeding nearer the surface of the soil, can be destroyed by the use of kerosene emulsion, and the question naturally arises as to whether we cannot use it successfully against our local white grubs in small areas, and also against the grubs of Fuller's Rose Beetle.

Lawns or spots badly infested with white grubs may be liberally sprayed with the prepared kerosene emulsion diluted in the proportion of one gallon of the emulsion to from fifteen to twenty gallons of water. After applying the insecticide the ground should be well soaked with water several times, so that some part of the emulsion may be carried farther into the soil. The grubs will be driven from the roots of the grass and will finally die; the grass will sustain no injury from kerosene in these proportions. Where the grubs of Fuller's Rose Beetle give much trouble, I would recommend that the soil about the roots of the plants be sprayed with the kerosene emulsion, in the proportions given for the White Grub, and that the ground be well soaked with water two or three times. A stirring of the soil before the application would increase its effectiveness.

In considering means for the control of the White Grub, we ought to pay more attention to the encouragement and protection of animals which help to destroy it. The much-abused skunk is a most valuable ally in lessening the numbers of the pests. Go over a field or pasture where White Grubs are plentiful, and if skunks live in the vicinity, we are sure to find innumerable little

holes made by the long claws of the skunk in digging out grubs. The flocks of crows which stalk over pastures and meadows, are often mostly employed in grub hunting. It is a difficult matter to obtain legislation for the protection of such an animal as the skunk, because of indifference, prejudice, lack of attractiveness, or from the fact that it may commit some offence. Its few evil deeds are likely to receive quicker recognition than its many good ones. In many hop growing regions the skunk now gets its full share of proteetion as a valuable grub hunter.

I have heard the story of a New England town, where the skunks had become so numerous that war was declared against them, a bounty being offered for each one killed, and they were almost exterminated. In the years immediately following, the grass was greatly destroyed by grubs. The people then, realizing their folly, ordered the protection of the skunk, and soon afterwards there was a marked improvement in the condition of the grass.

As a formula for making kerosene emulsion is not known by many persons, I will here present the one which has given most general satisfaction and is recommended by the Department of Agrfeulture.

Kerosene, two gallons; common or whale oil soap, one-half pound; water, one gallon. Dissolve the soap in the water and heat the solution, adding it, when boiling hot, to the kerosene. Churn the mixture by means of a force pump and spray nozzle for five or ten minutes. The emulsion, if perfect, forms a cream which thickens on cooling, and should adhere without oiliness to the surface of glass. Dilute before using, taking one part of the emulsion with nine parts of cold water. The three gallons of emulsion will thus give thirty gallons of inseeticide, which may be sprayed upon most plants with no injury to the foliage, but will prove fatal to many kinds of insects, especially those with soft bodies, or which obtain their food by sucking. Of course if a force pump is not available the emulsion may be stirred by any convenient means. A bundle of switches will answer, if the mixture is whipped long enough.

In using Pyrethrum powder, or Buhach, care should be taken to obtain it as fresh as possible, and it should be kept in air tight vessels until it is to be used. It may be used dry, either pure or mixed with five or six parts of flour; or it may be applied in

water, in the proportion of a large tablespoonful to a gallon of water and sprayed.

Hellebore is well known as fatal to the common Gooseberry and Red Currant Worms and to the larvæ of Sawflies, on roses and other plants. Besides being mixed in water in the proportion of about an ounce to two gallons, it is very often used as a pure powder, but it may be more economically applied by first mixing it with several times its own bulk of flour, in which case it will still prove very effective.

These two poisons are well adapted to common use in a small way as they are much less dangerous to man than the arsenical mixtures, the latter being also more likely to injure foliage than is the kerosene emulsion, which is a safe insecticide to handle. Of course a great many of the patented insecticides are effective and valuable. But they are usually very expensive when compared with the actual cost of the arsenical poisons, the kerosene, or other materials upon which they are largely based. Where large quantities of the poisons are to be used it is generally much more economical to prepare one's own insecticides.

Discussion.

Benjamin P. Ware said he was surprised that the borer infested locust trees to such an extent as the lecturer had so clearly shown, and that these pests accomplished so much damage in so short a time. The Apple Tree Borer requires three years to complete its round of life, yet does no more, and perhaps not as much damage, individually, in all that time, as the Locust Borer does in its less than one year of existence.

Mr. Jack said that one borer might kill a tree. Such a result would be brought about by one or more borers working in the sapwood until it was practically girdled. Borers in the heart of a tree are usually less dangerous to its life than those near the bark. He then referred to the use of kerosene emulsion on grass land, to destroy the grub of the May-beetle, and said that one part of the emulsion in ten was entirely safe, but that one part in fifteen would be strong enough for the purpose. He added that in no case was the grass injured in the least by the use of the emulsion. He believed it should be tried in greenhouses, to rid the soil of small, white grubs and other insect life that is sometimes more or less injurious to the roots of the plants.

Professor George F. H. Markoe said that clear kerosene did not seem to be injurious to grass or to tree trunks, especially if, soon

after it was applied, a spraying with water followed. The antiseptic properties of kerosene are surprising to one unfamiliar with its use in that direction. At Hull, the Tent Caterpillars had been working vigorously, and were well developed when his family arrived at their summer home. Mr. Markoe collected about two gallons of these insects, and put into the receptacle containing them a half-pint of kerosene. This not only killed every one, but it preserved them also, and quite as well as if treated with corrosive sublimate.

Mr. —— Fowler remarked that Locust Borers are not so plentiful in New York state as formerly. At one time it was feared that all the locust trees would be destroyed.

Mr. Jack, replying to a question, said he did not know of any parasite on the Locust Borers; still there might be such. There are parasites on some borers; some of them are provided with very long ovipositors to reach into the burrows of their prey. Such parasites are no doubt of much benefit.

Thomas L. Harrison inquired whether the Locust Borers ever attack apple trees or pine trees.

Mr. Jack replied that the Locust Borers never attack apple or pine trees; they do not attack even the honey locust (*Gleditschia triacanthos*). As to pine trees, if they are thoroughly healthy he did not think they were likely to be affected by borers. But if a pine tree is injured, or becomes weakened by any cause, borers will soon be at work upon it.

Francis H. Appleton stated that he had seen pine trees which were completely riddled by ants.

Mr. Jack said that true or black ants are very apt to go into trees which have been affected by borers, diseases or other injuries, but that they do not themselves injure the trees in the first place. The insects known as Termes or "White Ants" do sometimes affect living wood.

Professor Markoe called attention to a preparation, recommended as an effective protection from ants. He had found on analysis that it consisted of one part boric (formerly boracic) acid, and three parts of starch, by weight in each case, and both to be in fine powder. He was confident that it was a slow poison to most insects. The only objection to it was that the cost, for use in a large way, was prohibitive.

It was announced that on the next Saturday, a paper on "Metropolitan Parks" would be read by Sylvester Baxter, Ex-Secretary of the Metropolitan Park Commission, Malden.

MEETING FOR DISCUSSION.

Saturday, March 10, 1894.

A Meeting for Discussion was holden at eleven o'clock, Vice-President Francis H. Appleton in the chair. The following paper was read by the author.

The Metropolitan Park System.

By Sylvester Baxter, Ex-Secretary of the Metropolitan Park Commission, Malden.

The realization of a system of metropolitan parks for Boston, within three years of the time when the first definite suggestion to that end was made, furnishes one of the most striking instances of the remarkable responsiveness of public sentiment under modern conditions, when the right chord chances to be struck at the right moment.

The establishment of the metropolitan park system makes a decisive step in the organization of an adequate form of government for the great cluster of separate communities that properly form one great urban community, constituting what has come to be commonly known as the "Greater Boston," embracing today well nigh a million inhabitants. This was recognized by the preliminary Metropolitan Park Commission in its memorable report of a year ago: — "The time for this is distinctly come, and for several years legislation has been shaping itself to that end," said the commission. "The great increase of rapid transit facilities since the railroad system was originated, and their more recent development through electricity, has already made every town within nine miles of Boston a close suburb of that city. Those towns may in fact be said to be the bedchambers of the city countingroom. To Boston a great and always increasing proportion of those living in the surrounding municipalities now go daily to pursue their business or make their purchases; and from Boston they daily return to their homes. In everything but in name they are inhabitants of both places; and, in everything but in local government and in name, the two places are one. Each new appliance of rapid transit gives an additional impetus to this phase of development; and new appliances ever crowd upon each other. There is in the development, also, much that is good and

little that is bad; it is natural, healthy, and advantageous in a large way to all concerned. It should accordingly be recognized and made the basis of legislation; for without such recognition and consequent legislation the necessary provision for growth cannot be made. Of this the whole region referred to now shows abundant and lamentable evidence. Recognition has already been much too long delayed."

The first definite suggestion for a metropolitan park system was made early in the year 1891. A metropolitan park commission to investigate and report upon the subject was authorized by the General Court of 1892, and was appointed by Governor Russell in the summer of that year. Its report was made in February, 1893. In accordance with its recommendations the metropolitan park law was passed, and a permanent commission was appointed that year for the Metropolitan Parks District thus constituted.

At the present moment two great public reservations have been established, one to the southward and the other to the northward of Boston — comprising, altogether, something over seven thousand acres of beautiful wilderness; and a third reservation, comparatively small in extent but of great importance in its natural features, has been created to the westward. The commission, moreover, is actively engaged in the preparations for carrying out the other leading features of its great task; a work which may require several years before it can be completed.

What has already been done is of a character so great and far-reaching as in itself to justify the legislation asked for. But what remains to be done, and what will most assuredly be done, is of equal and perhaps greater moment. It seems marvellous, almost, in view of accustomed slowness in the execution of great movements, that all this could have been realized in so short a period. It is, however, to be regarded as the final and decisive step in a long process which has led to this end. There are several weighty factors that have entered into this process, and this action, which is of such great moment to this part of the world, forms one of the most notable events in the general park movement in the United States — a movement which should be briefly considered in this connection.

This movement had its origin in the impulse given by a great personality — as, in fact, all great activities find their beginning in individual initiative, and none, indeed, more so than those for

whose realization the collective endeavor of a community is necessary;— something especially to be commended to the consideration of those who are fond of asserting that such collective endeavor tends to weaken and destroy individual initiative. In truth, it may be said that therein individual initiative finds its greatest opportunity for effective application.

The park movement in the United States dates from the creation of Central Park in New York City. Though still young, and hardly yet fully developed as a park — for little more than a generation has passed since the work was first begun — Central Park well merits the name of historic. Had Frederic Law Olmsted not been given the opportunity which the design of this park presented, it is probable that one of the greatest artists of the age would not have arisen, and that the history of public parks in this country would have been quite different; it is likely that the great part which they already play in the lives of our city populations would today be wanting.

The institution of great public parks, as it is known in our American cities, is a development from the great parks that have long existed in the capitals of Europe. In Germany today are the most beautiful parks of the Old World, and in them we find the nearest approach to the best of our great American pleasure grounds. But in a certain way Mr. Olmsted is the founder of a new form of park, in which — while retaining all the natural beauty of the landscape, preserving it, enhancing it, making it more ideally natural, and even creating nature, so to speak, where her beauty has been obliterated, or perhaps has never existed — all the charm of the locality thus preserved or created is protected and made permanent by the character of the design. And the enjoyment of this charm is made possible for the greatest number by the adoption of methods that make all the essential features of such a pleasure ground accessible in all possible ways.

The main function of a park is that of providing for the multitude that enjoyment of natural scenery which is essential for the good health of an urban population in escape from the excitement and the jar of the ordinary conditions of city life that constitute one of the main sources of the degenerating influences ever at work in such a population. The great purpose of a public park is to furnish these opportunities, and to insure their enjoyment in the greatest possible contrast with ordinary urban conditions. In

connection with a park as thus designed provisions are made for such suitable amusement, entertainment, or recreation, as can appropriately be supplied under such conditions without interference with the main purpose of the place, and in a way to meet the needs of all classes of the population. These, of course, must vary with the character of the locality.

This is the work which Mr. Olmsted has done in a manner such as has never been undertaken before, and which could not have been done without an extraordinary sensitiveness to natural beauty, combined with a remarkable creative faculty, and an unprecedented fertility of resource in shaping means to ends and in the devising of new means to those ends — guided by a constructive imagination that could look far into the future and anticipate the formative growth of slow natural processes, together with the possession of the warmest sympathy which identified him with the great multitude and gave him the power, in appreciating the needs of all sorts and conditions of men, of meeting those needs in the fullest measure.

The great American public park, as thus developed, has become an essential institution, not only in nearly all the chief cities of the land, but in many of the minor centres of population, which are thus wisely providing for their future. In Boston the movement did not make itself felt until considerably later than in many other cities of similar rank. The great reason for this lay in the exceptional beauty of the suburbs of this city. Boston had the advantage of possessing within its limits, public open spaces of relatively small extent, to a greater degree than almost any other city in the country. Boston Common was, until the establishment of Central Park, the largest urban pleasure ground in the United States. The suburbs with their rural charms were easily accessible; there was during a long period but slight restriction upon a free resort to the fields, the woods, and the seashore. These things made the need of extensive public open spaces of a park-like character less apparent in Boston than in any other large city.

But with the extension of the urban population the beauty of the suburbs was encroached upon and the rural scenery was made less and less accessible to the mass of the population. The wiser heads in the community saw that parks would become a necessity at no remote day, and they urged the adoption of the measures needful to that end. But it was not until seventeen years ago that

the creation of a park system for the city was undertaken. The agitation that led to this result, together with the love of natural scenes that may be looked for in a community of exceptional intelligence, naturally aroused an interest in the landscape which gives the environment of Boston its remarkable attractiveness. With the growth of this sentiment public attention was called to the importance of preserving various spots of exceptional scenic interest in the neighborhood of the city. These sentiments found frequent expression in the Boston press. Men like the late Elizur Wright, Wilson Flagg, and John Owen, for instance — men of enthusiastic temperament and unselfish spirit — were untiring in this work of agitation. These efforts were concentrated to the greatest degree upon the beautiful wild region five miles to the northward of Boston, once known as the Five-Mile Woods and latterly as the Middlesex Fells. Suggestions for the preservation of the great oaks in Waltham near Beaver Brook were also made, and more latterly the creation of a public forest at the Blue Hills was urged.

The Massachusetts Horticultural Society — the wealthiest horticultural society in the world — has played a prominent part in arousing and developing public interest in this subject. Its Committee on Gardens, ever active in all the departments of its work, officially visited the Beaver Brook, or "Waverly," Oaks, in Waltham and Belmont, and also the Middlesex Fells, and in its reports to the Society upon those places, urged their reservation for public use and enjoyment. Furthermore, by public lectures and discussions, and by the offer of prizes, this Society has done good work in behalf of the preservation of forests; and also for the growing of new plantations of forest trees, thus converting otherwise worthless land into productive property, adding to the beauty of the landscape, and promoting the healthfulness of the district.

A very important factor in promoting a wide-spread interest in the rural scenes about Boston was the organization of the Appalachian Mountain Club. Besides its more distant mountain excursions, this club has conducted a series of regular weekly holiday trips to all the main points of interest in the neighborhood of the city, for many years past through every season. In this way there has been spread a more general knowledge and appreciation of the local landscape, and a very strong sentiment has been

developed for the preservation of the most attractive passages of natural scenery about the city.

In 1882 the interest in the preservation of the Middlesex Fells led to the enactment of the Public Forest law of that year. The local difficulties were such, however, that no action appeared practicable under its provisions. In the same year the General Park law was enacted. Under this many cities and towns of the Commonwealth have been enabled to establish parks and open spaces to a very considerable extent.

In the meantime Boston had developed its new park system to a degree that enabled the community for the first time really to appreciate by actual experience the true service and value of public parks in a proper sense of the term. In this way the more immediate wants of the urban community to the southward of the Charles River were met. To the northward, however, next to nothing had been accomplished until the city of Lynn gave a very great impetus towards definite and comprehensive metropolitan action by its important step in establishing, at the "Lynn Woods," a great public forest reservation of more than two thousand acres, within its own limits. Exceptional circumstances enabled Lynn to do this by itself. Among these circumstances may be mentioned the possession of an unusual number of public-spirited men who, when the city was made alive to the necessity of protecting its water supply from pollution by preserving neighboring lands from the encroachments of the rapidly growing population, had the energy to raise by subscription an amount sufficient, in addition to the sum appropriated by the city, to secure the conversion of the entire great wilderness into a public recreation ground.

The example thus set by Lynn was a great one, and it had a powerful effect in stimulating interest, not only throughout metropolitan Boston but in many other parts of the United States. It became evident, however, that with the metropolitan region divided as it was into many separate cities and towns, nothing further could be done to meet these needs in a comprehensive way through the instrumentality of purely local initiative. This being the case, the demand for some form of united and comprehensive action naturally arose. It was in the course of a study of the conditions of the "Greater Boston" suggested by the facts of the census of 1890, made for the Boston Herald, that

I had the honor to advocate, among the subjects that demanded treatment under some form of metropolitan administration — as the only method suited to the circumstances — the establishment of a system of metropolitan parks.

It was in response to this suggestion that the Trustees of Public Reservations took the first definite step which resulted finally in the creation of the Metropolitan Park Commission. A very important advance was that made in the incorporation of the Trustees of Public Reservations. This was brought about through the Appalachian Mountain Club, which, in April, 1890, called a conference of persons interested in the preservation of scenery and historical sites in Massachusetts. This conference was held in Boston, at the Massachusetts Institute of Technology, on May 24th. In consequence, the legislature of 1891 passed an act incorporating the Trustees of Public Reservations. The purpose of this Board was to hold in trust such beautiful and historic places and tracts of land within the Commonwealth as might be given into its care.

The leading spirit in this movement was Mr. Charles Eliot, the landscape architect; the most brilliant pupil of Mr. Olmsted, and now his associate in the firm of Olmsted, Olmsted, & Eliot. Mr. Eliot was made the Secretary of this Board, whose first annual report demonstrated its great usefulness. The charming tract of wild woodland in the Middlesex Fells known as the Virginia Wood was intrusted to the keeping of the Board by the late Mrs. Fannie H. Tudor, of Stoneham, in memory of her daughter, whose name it bears.

But the Board was made aware of the insufficiency of its powers for realizing the ends desired, in consequence of its lack of authority to acquire land by any other means than that of voluntary effort. The necessity for some method by which lands needed for public uses could be taken for the purpose by authoritative action became apparent. A meeting of the Park Commissions of Boston and of the various cities and towns in the immediate neighborhood, together with other persons interested, was therefore called by the Trustees of Public Reservations.

This meeting was held on December 16, 1891, and it was the unanimous sentiment that in order to secure for the country around Boston the benefit of the important open spaces whose peculiar suitability for public use was manifest, some form of

action was necessary which would enable the metropolitan region — that to various intents and purposes constituted one great city, just as metropolitan London constitutes one great city — to be treated as a unit for this purpose.

Through this meeting the subject was brought before the legislature of 1892. In consequence of the marked interest shown, an act was passed establishing the preliminary Metropolitan Park Commission. The Commission appointed under this act to investigate the subject consisted of Charles Francis Adams of Quincy, Philip A. Chase of Lynn, and William B. de las Casas of Malden. Charles Eliot was made Landscape Architect, and I was appointed Secretary to the Commission. The Commissioners visited personally every point of interest connected with their work within ten miles of Boston, and the results of these investigations were embodied in the report submitted to the legislature early in 1893.

This document attracted exceptional attention, and the extraordinary approval with which it was received, not only throughout the State but all over the country and in various other parts of the world, gave its recommendations a favor that caused their adoption by votes that very nearly approached unanimity. The result was that a permanent Commission of five members was established, with power to create a system of public reservations in the cities and towns comprised within the Metropolitan Park System. These were the twelve cities of Boston, Cambridge, Chelsea, Everett, Lynn, Malden, Medford, Newton, Quincy, Somerville, Waltham and Woburn, and the twenty-five towns of Arlington, Belmont, Braintree, Brookline, Canton, Dedham, Dover, Hingham, Hull, Hyde Park, Melrose, Milton, Nahant, Needham, Revere, Saugus, Stoneham, Swampscott, Wakefield, Watertown, Wellesley, Weston, Weymouth, Winchester, and Winthrop.

By the census of 1890 these communities contained a population of more than 888,000, or nearly forty per cent of the population of the Commonwealth.

For the purpose of carrying out the provisions of this act, the credit of the Commonwealth was advanced to the extent of one million dollars, the interest and annual contributions to the sinking fund necessary for meeting the bonds at maturity to be contributed by the various cities and towns of the district in proportion to the benefits received, as estimated by a Board of three Commis-

sioners, appointed every five years by the Supreme Court to fix the proportions thus to be paid. In this way no actual outlay was required on the part of the Commonwealth, and the burdens imposed upon any one community were not heavy, while the expenditure was distributed over a long period of years. As it was estimated that Boston would be very largely the gainer through the attractiveness of its surroundings which would thus be promoted, even though takings to be made should be chiefly outside of the city limits, the proportion to be paid by that city was fixed at fifty per cent for the first five years.

The range of activity contemplated for the new Park Commission thus constituted, as set forth in the report of the preliminary Commission, was very great indeed. It is desirable that the best features of the landscape that characterize the surroundings of Boston should be preserved and made available for public recreation, to an extent that should bring their typical elements within easy reach of the great mass of population occupying the metropolitan district. It could not be expected, of course, that every beautiful feature, deeply cherished though it might be, should be retained. Considerations of utility and public convenience must of course prevail, while any plan that should prove too expensive and involve too great a cost would of course be impracticable and defeat its own ends. The demands of business, of commerce, and room for the expansion of a growing population, would have to be given due and careful consideration. But it was essential that the future growth should be an intelligent one in these respects, and in the report of the preliminary Commission great stress was laid upon the fact that through lack of intelligence and lack of foresight in considering the needs of posterity, elements of beauty have been destroyed for merely temporary advantage, and often indeed for no advantage at all, which would now be of inestimable benefit in giving to various sections of the metropolitan district the environment needed, not only for the proper enjoyment, but for the sanitary welfare of their population. For instance, water fronts have been occupied in a way to bar out their use by the public, and rivers have been polluted and made a menace to the health of large communities while their banks have been mutilated and disfigured by private occupancy, when a proper system of development might easily have utilized the natural advantages conferred by these features in a way to make

them invaluable assets among the possessions of the community — factors of incalculable worth in the promotion of the public prosperity.

The scope of the Commission, therefore, comprises not only the establishment of great public reservations and the preservation of natural features of exceptional beauty, but the restoration, so far as possible, of the seashore in the neighborhood of Boston to a condition whereby the public may freely enjoy the privileges of access to the salt water; of improving the natural watercourses of the district in a way that will make them beautiful and valuable features of the region in place of the nuisances they have been allowed to become; of preserving the charms of the various beautiful ponds that form precious features of our suburban landscapes; and of establishing convenient and agreeable means of communication, in the shape of boulevards or parkways, between the dense populations of the metropolitan area and the various reservations established for their benefit.

All of this will of course require some years before even all the preliminary conditions essential to the realization of such a work can be brought about. The Commission has therefore to give its first efforts to the attainment of the main ends embodied in the plan of procedure devised for its guidance by its predecessors. In this work, of course, it is limited by the means placed at its disposal. It has never been claimed that this amount would be sufficient to carry out even the main features of the work agreed upon as desirable. The preliminary Commission expressly stated that the general financial provision made in the proposed bill which afterwards became a law was designed to enable the permanent Commission to enter on its work with energy and upon a suitable though reasonable scale, and it was estimated that this provision would be adequate for the immediate acquisition of the Middlesex Fells and the Blue Hills. This work has already been accomplished, and it is probable that the appropriation now at the disposal of the Commission will be sufficient to go considerably further.

The present Commission began its work as soon as practicable after its appointment last summer. It includes, besides the three members of the preliminary Commission, two new members. One of these is Mr. Abraham L. Richards, of Watertown, who was appointed for the short term of one year. Mr. Richards was a

member of the Charles River Improvement Commission, whose work in investigating one of the most important problems involved in the metropolitan park question ran parallel with that of the Metropolitan Commission. Mr. James Jeffrey Roche, the journalist and brilliant man of letters, was appointed as the other of the new members, but after a few months' service he found himself too much occupied by his regular duties to give the time to the work which he felt it demanded. Mr. William L. Chase, of Brookline, was made his successor. Mr. H. S. Carruth, of Boston, recently Chairman of the Board of Aldermen, and a man of high business capacity for dealing with the practical questions involved in the work of such a commission, was made the Secretary. Messrs. Olmsted, Olmsted, & Eliot were engaged as Landscape Architects.

Before any positive steps could be taken in the way of establishing any of the public open spaces contemplated, a large amount of preliminary work was necessary. In the first place, the landscape architects had to give a careful study to the conditions of the localities; for naturally their judgment would guide the Commission in its determinations, and the question of the proper bounds—which it was necessary to agree upon before the necessary surveys could be made — had to be decided. It is very desirable that the boundary of a reservation for public use should follow the line of a road, for the sake of accessibility and of enabling the owners of adjacent property to take the best advantage of the benefits afforded by the neighborhood of a public domain. Therefore lines have to be followed which will give a road of easy grades and agreeable conditions. This is a task not easy to accomplish, but the work has been energetically pushed, the proper studies have been made, the necessary surveys have been finished, the concurrence of the local Park Boards required by the law has been obtained, and already the Beaver Brook Reservation, the Blue Hills Reservation, and the Middlesex Fells Reservation have become public domains, in the order of their mention.

The name Reservation has been applied to these public holdings rather than that of Park for good reasons. It will be years before any elaborate form of improvement will be in order for these places, either as justifiable by the resources at command or as demanded for the uses of the public. These uses, while they will naturally be considerable in the very near future, will for a

long time to come be perfectly consonant with their maintenance in their present condition, as for the most part a wilderness. They will need little care beyond that of protection against wanton injury and of access by simple roads similar to those which have been constructed at a remarkably low cost in the Lynn Woods. Therefore it is better that they should be regarded merely as public reservations, held for improvement as future occasion may demand.

The word Park, moreover, is a term that has been subject to great abuse. The expression has been used with such a wide range as to seem applicable to almost anything short of a boot-jack! In actuality its meaning has been stretched to cover such diverse things as a race track, a collection of artillery, of army wagons, and even a commonplace city street. Here in Boston we have only just got rid of the name as applied to a street upon a large portion of which there was not a single tree, or even a blade of grass,—I refer to Chester Park, etc., whose name has been changed to Massachusetts Avenue. The term is convenient in its use as a generic designation for public pleasure grounds of all descriptions, and its application in that way may now be regarded as legitimate; but strictly speaking the name properly belongs only to one type of pleasure grounds, of which our Franklin Park may be regarded as a conspicuous example. That is, a landscape is park-like in character when it consists of a country more or less open, and interspersed with trees standing singly or in groups. Beaver Brook Reservation, for instance, with its groups of grand old oaks and other trees, is genuinely park-like, and might properly be called a park. The great open valley spaces in the Rocky Mountains are very appropriately called Parks. It seems best, in the specific use of the term, to avoid its application as far as possible to any pleasure ground which is not really park-like; as, for instance, a public garden, or a city square, and on the other hand to reservations of a forest character, like those just established by the Metropolitan Park Commission.

The Beaver Brook Reservation, in Waltham and Belmont, within a few minutes' walk of the Waverley Stations on the Fitchburg and Boston & Maine railroads, was the first to be established in the work of the Metropolitan Park Commission. This was done largely with the generous aid given by the widow of the late Elisha Atkins, of Belmont, and her son, Mr. Edwin

F. Atkins, who is the Chairman of the Belmont Park Commission. Together, they contributed $12,500 for the purpose. This sum, with the amount added by the Metropolitan Commission, has enabled the taking of a beautiful tract of something like sixty acres. This comprises the lovely pastoral landscape, with the remarkable formation, originating with the glacial period, known as a "kame" — a long, serpentine ridge, running out from the shoulder of Helmet Hill, close by, and losing itself in the meadow coursed by Beaver Brook, which flows along its left side on its way to the Charles. Upon the slopes of this kame grow the famous old oaks which tree lovers regard as the finest examples of their kind in the United States. These trees have been admirably described by Mr. L. L. Dame, of Medford, in his valuable book, "Typical Elms and other Trees of Massachusetts," which contains excellent photographic pictures of the group made by Mr. Henry Brooks. The oldest of these trees are estimated to be at least one thousand years old.

The reservation also includes the valley of the brook to a point beyond the upper of the two small ponds which are formed in its course, together with the beautiful cascade sung by Lowell in his exquisite lyric, "Beaver Brook." In the cottage near this cascade was the home of the late Mr. Robert Morris Copeland, the landscape gardener. Its extraordinary beauty and its charming associations with a great name make this reservation, though small in extent, one of the most valuable features of the Metropolitan Park System. It is in the near neighborhood of rapidly growing populations, and it is easily reached from Boston, Cambridge, and other parts of the metropolitan district, by the frequent trains of two lines of railway.

A large area of permanent open space in this section is assured by the grounds of the McLean Asylum for the Insane, the Convalescent Home, and the Massachusetts Home for Feeble-Minded and Idiotic Youth; all of which are established close by and assure the preservation of the natural beauty of the surrounding landscape.

The Blue Hills Reservation is the second established in the Metropolitan Park System. This has an extent of four thousand acres, and comprises practically the entire mountain-like range of the Blue Hills. Mr. Charles Eliot, in his admirable report to the preliminary Metropolitan Park Commission, very aptly character-

ized this region of the Blue Hills as "a park such as any king would be proud to call his own, a public forest possessing a vastly finer scenery than any of the great public woods of Paris can show, a recreation ground far surpassing in its refreshing value even London's Epping Forest."

The reservation is something like five miles long, and of varying width, its boundaries following contour line of from two hundred to three hundred feet above the sea level. The reservation includes eleven prominent summits, and the beautiful piece of water on the southerly side called Hoosicwhissic Pond. The Blue Hills are the highest points of land near the ocean from Mount Agamenticus in southern Maine along the entire Atlantic and Gulf coast to the southward. The highest summit is 635 feet above the sea level, but being near the ocean the altitude counts for its full value and gives the range a really mountain-like appearance.

These hills have a special historic interest, in the fact that they gave our famous Commonwealth its name; Massachusetts meaning, in the Algonquin tongue, "the place of the great hills." "Massachusetts Mount" is the name given to these hills by Captain John Smith, and when he asked Prince Charles to christen the various places on the map of New England which he placed before him, that royal boy gave the name of Cheviot Hills to the range. The suggestion has been made that Massachusetts Mount be the name of the chief eminence, commonly called the Great Blue Hill; and it seems entirely appropriate that this should be done, thus recording in perpetuity a historic fact of uncommon importance.

The prospects from the Blue Hills are very wide, varied, and beautiful. The scenery is grand and wild. The air is pure, and the existence of such a magnificent tract of wilderness within ten miles of the State House assures a great and steadily increasing popularity for the place as a magnificent natural recreation ground. It is accessible by rail at either end, from the Readville stations of the New York and New England and the New York, New Haven and Hartford railroads, on the west, and the West Quincy station on the Granite Branch of the latter railroad, on the east In all probability Blue Hill Avenue will in the near future become a grand boulevard, with electric car communication, running in a bee-line from Franklin Park to the westerly end of the reservation. In addition the joint action of the Boston Park Board

promises to establish a beautiful line of parkway connecting the Boston chain of parks, either from the Franklin Park or the Arnold Arboretum, by way of the proposed Metropolitan Reservation at the Stony Brook Woods in Hyde Park and the West Roxbury District of Boston, and thence by way of Mother Brook across the Neponset to the Blue Hills. The Blue Hills Reservation lies in the towns of Milton and Canton and the city of Quincy.

The last of the three reservations established by the Metropolitan Commission up to the present time is the Middlesex Fells. Its nearness to the city, the southern boundaries but about five miles from the State House, gives it particular value as a great popular recreation ground, where the scenery of the natural wilderness can be enjoyed by the multitudes from the swarming populations near by, who in a few minutes after passing the boundaries may lose themselves in a wild region where is nothing to remind them of city life.

The Middlesex Fells Reservation lies within five distinct communities; the cities of Malden and Medford, and the towns of Stoneham, Melrose, and Winchester. Close at hand is a population of more than one hundred thousand, whose needs in the way of a great pleasure ground will thus be served on a magnificent scale, while the reservation lies within convenient reach of at least a half million people more.

The taking made by the Metropolitan Commission here amounts to about sixteen hundred acres; but as something like the same area of land and water had already been taken for water supply purposes and park purposes by the surrounding communities, the entire extent of public domain embraced within the Middlesex Fells amounts to something over thirty-two hundred acres. This reservation includes Spot Pond and the two beautiful great basins of the Winchester water supply that look like natural lakes, together with the lesser pieces of water known as Doleful Pond and Hemlock, Shiner and Western Pools.

On the easterly margin is a beautiful cascade, and the grand cliffs and crags give character to the region. The woods are for the greater part of recent growth, but in the easterly section there are some noble tracts of white pine and hemlock. In general aspect the Middlesex Fells Reservation has a similarity to the Lynn Woods, although each possesses features that give it individual character. The latter, although entirely due to local initiative and the public

spirit of the progressive citizens of Lynn — among whom particular credit belongs to Mr. Philip A. Chase, the Chairman of the local Park Commission as well as a most valuable member of the Metropolitan Commission — is naturally to be considered as belonging to the Metropolitan Park System, and forming one of its most important features. Counting its two thousand acres, the three great metropolitan reservations have a total area of more than nine thousand acres, which, with prospective additions, will carry the total to something over ten thousand acres.

Before the Metropolitan Park Commission began the work of securing reservations, there was already, in the outlying cities and towns of the Metropolitan District, about three thousand seven hundred acres of land appropriated for parks and pleasure grounds and other public purposes; including the water supply reserves of Brookline and Newton along the Charles River in Newton, Wellesley, Needham, and Dedham, which covered two hundred and fifty acres, and seven hundred acres respectively, while within the city limits of Boston, about sixteen hundred acres had been set apart for park purposes. These areas, with those which the Metropolitan Park Commission has secured, and others which it will soon acquire, make a grand total of between thirteen and fourteen thousand acres, for the metropolitan district.

Boston may thus be seen to be the most favored city in the United States, in the way of space devoted to recreative purposes, so well distributed in all directions as to meet the needs of the population most admirably. The thing most lacking throughout a great extent of the metropolitan region is sufficient space for small local playgrounds or breathing-spots. Some communities, like the city of Everett, for instance, have not so much as a square foot of public pleasure grounds.

We have already seen that there is a great work for the Metropolitan Commission remaining to be accomplished. Chief of these as yet untouched features is the contemplated reservation of Revere Beach, which may be regarded as perhaps the most important feature of all, from the recreative value which the ocean side possesses for the multitude. Then there is the important Charles River problem, to which Cambridge as well as Boston, together with Newton and several other communities along the stream are giving their direct attention, while the Metropolitan Commission and the State Board of Health are considering this matter in its

more general aspects of a recreative and sanitary character. Extensive and beautiful recreation grounds bordering that stream throughout the greater part of its course through the metropolitan district may be looked for. The connecting links between the various open spaces of the metropolitan district, in the way of parkways and boulevards, will probably be made the subject of careful study on the part of the Commission and its Landscape Architects. The natural routes for such ways presented by the topography of the region afford opportunity for beautiful features of this kind at a low cost, and assuring an immense benefit in the development of the communities through which they pass.

Considering for a moment the future development of the great wilderness reservations, we may consider it as something in this wise: The effort will be to maintain the aspects of an absolutely wild country, modified only by such means as are essential to make it accessible for the public; with good simple roads of easy grades, and pleasant footpaths and rides penetrating its depths; with shelters from inclement weather established here and there; with refectories at convenient points, and possibly good hotels where people may go for a sojourn amid natural scenes to which the conditions of these localities will give exceptional charm. The growth of the forests will be encouraged by the best precautions against fire that can be devised, together with the adoption of a system of scientific forest administration, which can be made invaluable for the country at large in the practical example thus given.

In time these reservations will be entirely covered by stately woods, penetrated by pleasant roads winding through the valleys and along the slopes, whence, from the sylvan depths, there will be beautiful vistas framed in foliage. Winding to the summits of the hills, these roads will at such points command broad and pleasing prospects. These great natural pleasure grounds will be accessible from all directions by the pleasantest of ways for riders in carriages and on bicycles and horseback, whilst steam and electric railways will furnish transportation for holiday throngs. We shall see Revere Beach — and ultimately, it is hoped, Nantasket also — cleared of the present unsightly encumbrances; its splendid curves of shining sands unobstructed from end to end; a wide ocean-side road running along the crest, and bordered by sightly structures which will be pleasing to see and to inhabit.

There will be direct connections with Lynn and its beautiful woods, as well as with the shores of Nahant and Swampscott, by the fine old Parkway of Lynn Common.

With its streams running clear and unpolluted, and with green and pleasant banks, and with its bay-side and ocean-side reaches free and beautiful; with its playgrounds and blooming, tasteful gardens, its miles of charming drives, its thousands of acres of parks and public woodlands, the "Greater Boston," as the home of a happy, intelligent, and truly prosperous people, will then be a city worthier than ever of fame.

[Since the above paper was prepared the Metropolitan Park Commission has taken between 500 and 600 acres of woodland wilderness in the West Roxbury district of Boston and the town of Hyde Park, and named it the Stony Brook Reservation; it has also taken, in conjunction with the Boston Park Commission, lands for connecting this reservation by a picturesque parkway, with the Boston park system at the Arnold Arboretum, with the intention of ultimately extending it to the Blue Hills. The Legislature has also authorized a loan of $500,000 for the taking of Revere beach, $300,000 for the taking of lands along the Charles River, and $500,000 for the construction of boulevards and parkways — the latter as a relief to the unemployed.— Sylvester Baxter.]

Discussion.

Jacob W. Manning said that about 1880 he became connected with the Middlesex Fells Association, which was organized under the inspiration and leadership of Elizur Wright of Medford. During that season a meeting of the Association was held at Cheese Rock, on Bear Hill, in Stoneham. Cheese Rock is the smooth, abrupt, northerly termination of the top of Bear Hill. Its nearly flat upper surface comprises several square rods, and its altitude is sufficient to command an extended view of the country to the north, the east, and the west. As the speaker was unable to attend this meeting, he sent his son, Warren H. Manning, then a minor, to observe the proceedings and report to him. This young reporter was much impressed by the strong interest and public spirit manifested by those present, but especially by the activity and physical vigor of Mr. Wright, who, though then seventy-five years old, climbed a bare-trunked cedar tree near by, with the

agility of an athlete, and hung out a flag to indicate the place of meeting. The natural beauty of the surrounding landscape, and the capabilities of the whole Fells district for improvement as a public park, were discussed by the earnest orators, as was also the heroism of the first settlers of New England. Long, wood-road rambles over the territory were included in the exercises of this gathering. Later in the year Mr. Manning attended meetings of the Association in Mr. Wright's office, which was in the American Insurance Co.'s Building, then on Milk Street, Boston. Among those present at these gatherings were John Owen and Wilson Flagg, of Cambridge; Colonel Lyman Dike, of Stoneham; L. L. Dame, of Medford; S. W. Twombly, of Winchester; Judge Churchill, of Milton, and several other gentlemen. In 1881, another field meeting was held at Middlesex Fells, Cheese Rock being headquarters. It was late in the summer, and was a very warm day. There were several ladies in the company. The exercises were chiefly those of exploration. To inspect the Fells (an area of four thousand acres or more) in this manner, one has to pass over a greatly varied surface; here an area of low swamp land; there a tract covered by impenetrable thickets of shrubs, and climbing or trailing vines; again over rising ground; up and over broken ledges, and bold crags of the most dangerous, break-neck character. Again one would be in ideal woodlands of tall forest trees of many species, covering an area many acres in extent, of lands suitable for cultivation, either as farms, gardens, or orchards. The thoughts inspired by such surroundings, found expression sometimes as follows,—Romantic drives could easily be made here, leading to retired mansions that wealth might erect! What a grand park this would make! These and similar remarks were frequently heard as the party wandered through this wild region. In those early meetings, the interest in the scheme was strong; and if the thought occurred to any of those present, that a long time would elapse before some practicable plan would be adopted to secure a system of forest reservations, and the question came into mind when such a plan would be consummated—certainly these feelings did not then generally prevail in the gathering. Finally it was suggested that the General Court be petitioned to enact a law under which it could be done. The petition, numerously signed, was presented to the Legislature of 1882, and referred to the Joint Committee on Agriculture, of which Hon.

James S. Grinnell, of Greenfield, was Chairman. At the hearings given by that Committee, on this petition, Mr. Wright, Mr. Manning, and others of the petitioners appeared and urged not only the propriety but the need of such a law as was described in the petition. Mr. Grinnell reported from his Committee a bill, authorizing cities and towns, under certain restrictions, to purchase or seize by right of eminent domain, lands for the preservation or reproduction of forests or to protect water supply; the title of such lands to be vested in the Commonwealth, in perpetuity, for the benefit of the cities or towns, acquiring them. It provided that the State Board of Agriculture should act as a State Board of Forestry also, and should have the supervision and management of lands taken or purchased under this act. The speaker said that the law covered all that the petitioners asked, and a kind of jubilee meeting was held in the Medford Town Hall that season, at which Governor Long and many other noted men were present, to rejoice and to carry forward the work. Much enthusiasm was manifested. Elizur Wright donated to the Association sixty acres of land north of his house; and it was expected that many other owners of land would make similar donations. Subscription papers were circulated, and many thousands of dollars were pledged, with prudent conditions.

In 1883, a notable meeting and banquet occurred in Boston, at which a more formal organization was effected, and a Board of Trustees was elected to take charge of the Middlesex Fells as a public reservation. Francis Brooks, of Medford, was made Chairman of this board. But Mr. Brooks went abroad, and was absent from this country for some time, and Mr. Wright died suddenly. No other member of the board of trustees took up the active leadership, and the interest naturally languished. An interval of several years followed when nothing was done, until the movement started which led to the establishment of the Metropolitan Park Commission, through which not only the Middlesex Fells but the Beaver Brook valley, and a larger tract including the Blue Hills region, have been taken already. It is probable that portions of our seashore may yet become public domain through the same instrumentality.

Leverett M. Chase spoke of the paper which had been read as an admirable one, covering the whole ground of public health and the general public weal. But he asked what is the educational

value of public parks — are the morals elevated, the sense of beauty increased, and the tastes refined?

David H. Brown inquired whether the territory taken by the Metropolitan Park Commission, under the general name of Middlesex Fells, comprised all the land on the southern side that ought to be included in the public reservation.

Mr. Baxter said that if the Commissioners had been empowered to take all the land on the south side that they considered desirable to include in the public reservation, it was feared by some that Medford would not have much room to develop in that direction. Moreover it might have involved too great an expense. However, since the final action of the Commissioners, it is said that those who were then opposed to the southern extension of that reservation have changed their views, and that desirable additions may possibly yet be made to the Middlesex Fells. It is also intimated that the Blue Hills reservation will receive additions, by gift possibly, amounting to several hundred acres. The Middlesex Fells, the Lynn Woods, and the Blue Hills will afford admirable haunts for innoxious wild animals that can live in this climate. No shooting will be allowed. A Zoölogical Garden, in connection with Boston Parks, has been much desired, as an addition to the attractions of this city. The Boston Society of Natural History has long had under consideration plans for the establishment of such a collection, but has not been as active as it should have been in its endeavor to realize them. The institution of the Metropolitan Park System is a decided step toward making some plan of that kind practicable. Had more energy been shown in the movement to realize this project, the Aquarium designed for Marine Park, and the proposed Zoölogical Garden in Franklin Park, might now have been well under way.

Mr. Chase asked whether every large park should not have a zoölogical garden as a part of its area, in which typical animals of our latitude and of other latitudes with congenial climates should be kept for public amusement and instruction, especially as object lessons for the youth of our cities who are studying geography and zoölogy. In the zoölogical gardens in other cities the deer will nibble bread from one's hand. The kind treatment of these animals would form an education in humanity for the young.

Mr. Baxter, in answer to a question, said that Boston had no method of setting aside land for public use except seizing it by

right of eminent domain. In Philadelphia there is a system under which the authorities not only project streets for future needs, but in connection therewith select lands for permanent open spaces. All building upon the ways and lands thus laid out is prohibited, but the owners can have the use of the land, for other and temporary purposes, until wanted by the public. By such a system there is a saving of an enormous amount of expense which would be incurred if the authorities neglected to act in the matter until public convenience demanded it. In Boston the recent institution of the new Board of Survey gives us a system whereby a plan of street improvement may be fixed upon for undeveloped territory, thus securing a well considered system of street building for the future. Boston has thus only just begun to do what New York and Philadelphia did, early in the century, in fixing their lines of street building, although, to be sure, their seemingly simple, but really costly and inconvenient rectangular systems, adopted without regard to surface contours, would not commend themselves today, especially in Boston. But it would be well if Boston and the metropolitan district should adopt the Philadelphia idea of laying out future open spaces for recreative use in connection with the work of the Board of Survey.

The Chairman said that he attended the meeting of the American Forestry Association which was held at Albany, N. Y., in conjunction with other organizations for like objects. In that connection he visited the Adirondack Park, or portions of it. This great forest reservation is laid out with fixed boundaries, including many thousands, if not millions, of acres of land; it covers large portions of several counties, and of many towns in the northeastern quarter of the State. The establishment of this Park was proposed by the State Forestry Commission, who formulated the plan, and are custodians of the property. At the meeting in Albany, Mr. Appleton found that, in common with himself, those present felt deeply the lack of public interest in forestry, and the great need among our people of more knowledge of the science involved in forest culture, which knowledge would beget an increased interest. The chief point in regard to lands which the State cannot own, is that the State should have control of the woods and waters throughout her domain, for the conservation of commercial and healthful interests. In connection with his observations at Albany and the Adirondacks, he would have been much

gratified to hear Mr. Baxter's views in regard to advanced treatment of forests.

Notice was given that on the next Saturday Hon. James J. H. Gregory, of Marblehead, would read a paper on "Growing Seeds for Market."

MEETING FOR DISCUSSION.

Saturday, March 17, 1894.

A Meeting for Discussion was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair. The following paper was read by the author:

Growing Seeds for the Market.

By Hon. James J. H. Gregory, Marblehead.

Fifty years ago the seed business of the United States was in the hands of the local dealers and the few firms who carried on what is known as the "box trade." The latter filled boxes with small packets of seeds, and left them at country stores throughout a wide district to be sold on commission. In this trade the community called "Shakers" was prominent. The firm of Comstock & Ferre, of Wethersfield, Conn., also did a large business in the Northern States; and the Landreths and Buist at Philadelphia did the same in the southern part of this country. All of these had an excellent reputation for reliability. As new firms increased, the trade became demoralized, until the public believed that, by some dealers, the same packets were offered year after year until sold, as their power of germination seemed an unconsidered factor. A fellow seedsman tells me that an agent of one firm acknowledged to him that a certain package of parsnip seed was then on its fourth season's round, though it is a seed that is not reliable after the first year. Some thirty years ago an agent of a firm in the box trade sent me a circular containing wonderfully low quotations for a number of varieties of vegetable seed, explaining matters by stating that while the seeds quoted were too old to vegetate they would do to mix with new seed. As the seed sent out by the Agricultural Department at Washington has often been criticised

as lacking vitality, perhaps the following incident, well known among seedsmen, may help to throw some light on the matter: A certain well-known seed grower got on the right side of a former Commissioner of Agriculture through his skill in handling cards, and so secured from him a very large seed order for the government. Calling on one of the largest seed-firms in the United States, he asked them for their very lowest quotations, quality not to be considered. They quoted accordingly, with the mutual understanding that the seeds were mere refuse, deficient in vitality and therefore worthless for planting. He bought the entire lot — a large one — and directed them to pack in large sacks and deliver without any address at the freight depot. The head of the firm, gifted with a fair share of curiosity, inherited from mother Eve, and desiring to learn where such trash could be disposed of, sent a clerk down to make note of the address given to the lot. On his return he reported that all the sacks were addressed to the Agricultural Department, Washington, D. C.! Let it not be inferred from this that equal rascality and carelessness has entered into all the purchases of seed by the Agricultural Department, for I know that in many instances thorough honesty has been exercised and as much care as could be reasonably expected from men who were better politicians than seedsmen.

About forty years ago a movement began to introduce new and better varieties of vegetables. This was for the most part done by advertising in the agricultural papers, and was the starting point of the vast express and mail business of our day. At that date, and for many years later, the West sent East to procure her seed, as it did for nearly everything else except raw material. Now in seeds as in manufactured goods, she is largely self-supplying.

In seed raising, all vegetables are classified into annuals and biennials, as they bear seed the first or second year. The vines are all annuals; the garden vegetables about all biennials. To raise seed of biennials, the roots must be kept over winter and set out again in the spring. In this respect, seed-growing in the Middle States has an advantage over that in New England, for some of the kinds can there be left out over winter where they grew, with but slight protection, and there is, therefore, much less cost in the handling of them.

Including herbs, there are about seventy different species of vegetable seeds planted in the farms and gardens of the United States, and some of those species are very closely allied, as the cabbage, cauliflower, Brussels-sprouts, broccoli, collards, kale, kohl-rabi, and turnip, of the same family—almost of the same genus. Of these seventy species, there are about four hundred varieties found in the catalogues of the seedsmen of this country, if we except the potato, of which, at the present time, inside and outside of catalogues, the varieties are almost infinite.

In addition to these varieties, sub-varieties, or what are known among seedsmen as "strains," are found more or less catalogued, while the uncatalogued "strains" are countless, every village in the land having something of its own; something a little earlier or a little later; a little larger; a little sweeter; a little more prolific; a little better flavored; a little more dwarf in its habit, or differing in some way from the variety found in the catalogues of seedsmen. When these differences are found to be so strongly marked as to make them real acquisitions, it becomes the legitimate business of the intelligent and enterprising seedsman to lift them out of their local obscurity and honor them with a place in his catalogue as new varieties.

Of the seventy species of vegetables catalogued, less than twenty enter into the general consumption of the people, the remainder being mostly confined to the inhabitants of the large cities, and but rarely wandering outside of the grounds of the market gardener.

Where the seed sold by American seedsmen is grown is for the most part a question of cost and of climatic condition. Of the seventy species of vegetable seed, more or less of over half the varieties are imported; of mangel-wurzel, about all; ruta-baga about nine-tenths; spinach, about nine-tenths; cauliflower, nearly all; lettuce, about half; carrot, about half; egg-plant, about half; parsnip, about one-third; radish, about all, with the exception of Messrs. Landreth & Son, who practise raising their own. It is the general belief of American seedsmen that foreign-grown radish seed is larger and better than home-grown. Parsley seed is largely imported; Brussels-sprouts, broccoli, chiccory, endive, kohl-rabi, and Swiss chard are almost wholly imported, as is salsify to a large extent.

Of celery, the finest varieties are grown in this country in the vicinity of our large cities. Of cucumbers, but a few, and those of the fancy frame sorts, are imported. Of peas, the hard sorts are home-grown, and most of what are called the softer, or wrinkled, varieties. Of turnip seed, the early varieties are largely home-grown. Of cabbage seed, but few varieties are imported, and these are confined almost wholly to a few early sorts. Onion seed, with the exception of the Italian varieties, is almost wholly an American crop.

The trouble about foreign cabbage seed is, that the Drumhead varieties which we cultivate in this country for the table, abroad are merely grown for the consumption of animals, and the seed is very generally raised from the stump. They grow them for massiveness, not hardness. Being only fed to stock, they are not classed with table vegetables; whereas here we grow them for home consumption by the people, and aim to secure hard, solid heads. The English-grown drumhead seed is, therefore, miserable stuff, and hence it is not imported—certainly not by any seedsmen who have any care for their reputation. An English seedsman laughed at my folly when I told him I raised cabbage seed from the head. "Why," said he, "what a waste! we feed the heads and raise seed from the stumps."

The foreign sources of seed are Canada, England, France and Germany. The importations from Canada are confined to peas. Peas grown in many parts of the country are very apt to be buggy; the preventive, as far as there is one, being to plant where the intruder has not yet made his appearance, or so late that when the pea blossoms his depredations will be past. Within a few years a volatile compound, bisulphide of carbon, yielding a suffocating stench, has been applied. This, used in small quantities in some air-tight receptacle, among peas containing embryo weevils, destroys them before they begin their mischievous work. Other reasons why peas thrive especially well in Canada are found in the cooler climate, which is more natural to the vegetable, and in the cool, strong, clay soil, to which it appears to be especially adapted.

From England we obtain most of our mangel-wurzel seed, some of our early cabbage seed, some varieties of carrot, celery, frame varieties of cucumber, leek, kohl-rabi, parsley, peas, radish, and turnip, and a portion of our flower seed. One reason of this is,

that in England the climate is such that some of their seed stock—mangels and cabbages, for example — to a large extent remains out all winter, and they can grow seed very cheaply on that account. We have to bury such stock, and there is some loss in carrying it through the winter. With the smaller varieties of cabbage, it is about "hit or miss." The chances are about half against any attempt to raise seed from them, simply because we must expect some waste, and, as you all know, it takes the loss of but a few layers of leaves to use up the heads of the smaller varieties.

From France and Germany come, as a rule, the choicer varieties of vegetable and flower seed. When they want something rather extra in purity or the finest strain in the vegetable or flower seed line, such as cauliflower, celery, lettuce, egg-plant or radish, our seedsmen are very apt to turn towards France or Germany, rather than the mother country, even though they may sometimes have to pay rather a higher price for their purchase. The prices which some choice seed bring would astonish you. I have paid as high as $200 an ounce for choice cucumber seed.

Sixteen years ago, statistics of seed-raising in the United States were very hard to procure. There were no records in regard to it, and to get my data when writing on the subject at that time I had to depend upon facts obtained through correspondence with individual growers. Three years ago, for the first time, the United States government obtained and published the statistics of the seed business. From this report we present a few interesting facts.

David Landreth, who came to this country from Scotland in 1784, a few years later established, near Philadelphia, in connection with a nursery, a seed farm which is believed to have been the first in this country. Up to 1850, about which time I began raising seeds, there were less than nineteen seed farms in the United States, and ten of these were in Connecticut. The Census of 1890 enumerated 596 such farms, of which Massachusetts had twenty-five, containing 1,221 acres. The total area of all these farms is 169,851 acres, valued, with tools and buildings, at $18,325,935, in 1890. The acres given include those growing seed and seed stock.

For half a century prior to 1850 New York and Connecticut produced more seeds than all the other states combined. New York and New Jersey grow over half the asparagus seed used in the United States. New York, Illinois, and Michigan grow five-sixths of the seed beans; New York, Ohio, Nebraska, and Cali-

fornia over two-thirds of the beet seed; New York and Pennsylvania half the cabbage seed and three-fifths of the carrot seed. Nebraska and Ohio are the great sweet corn growing states; Ohio and Tennessee the great field corn states. Nebraska and Kansas grow most of the cucumber seed, and New Jersey about as much egg-plant seed as all the other states combined. California grows nearly as much lettuce seed and twice as much onion seed as all the other states. New York, Michigan, and Wisconsin grow more peas than all the rest; Michigan grows about three times as many acres in squash seed as the New England States, while of tomato seed she raises about seven times more than all the others. New Jersey grows more muskmelon seed than all the other states; Tennessee and Kansas exceed all others in growing watermelon seed. Nearly all the turnip seed is raised in New York and Connecticut, while Iowa, California, New York, and Pennsylvania raise nearly all the flower seed.

Manuring for Seed Crops.—For annual seeds, such as corn, peas, beans, etc., we manure about the same as for common farming, varying as to quantity and method of application. Biennials we feed as a rule more liberally, applying for seed onions, say, ten cords per acre of good barnyard manure, broadcast; and after the onions are placed in the drill and before covering, applying five hundred pounds of a complete fertilizer, of good quality, and then covering; if applied before placing the onions, the root is liable to be burned. For seed cabbages, we prepare the drill or furrow by running a heavy plow through it twice; or sometimes dig a hole for each cabbage. First, set the root, and then throw in half a forkful of good manure close to each cabbage, as the new roots will be short; and upon this a half-handful of some fertilizer. Pack it with the foot and then cover with soil. Thus set, the plants will not be blown over. When mature they are sometimes nearly six feet high. For beets, four or five cords of good manure per acre is ample on land in good heart. Too highly fed they run to leaf and giant stalks. After cabbage stock is set, if it is not too much sprouted, the trenches may be filled by using Prout's or Chandler's horse hoe. The same may be applied to beets and onions, if not too much grown. The cultivator should be run through all seed stock ground once a week and the weeds close to the plants removed by hoe or hand. We hill most seed stock to give more support to the seed plants.

Gathering, Drying, and Cleaning the Seed.—The stalks of cabbage and cauliflower seed are pulled when the seedpods have acquired a reddish color, laid on the ground and turned once or twice. Beets are pulled when a large proportion of the seed appears ripe. Onion seed tops are gathered when a small proportion of the seed vessels have opened and show the seed. This must be done promptly. They are dropped into baskets or bags, hanging from the neck of the harvester, which, when filled, are emptied upon large sheets of stout, twilled cotton cloth. Two or three cuttings are necessary, as the seeds of these, and carrots also, ripen unequally as to time. The onion seed tops are spread one deep over frames in an airy loft to dry. Dandelion seed must be gathered early in the day or it will sail away.

The seeds are sometimes threshed out with a flail, upon a "floor" prepared upon the ground. The spot is cleared of stones, made smooth, then covered with old bagging, and a large spread of sail canvas over that. One holds the bunch of seed stalks, while two others thresh out the seed. Each half-day's threshing-product is taken up and carried into a dry, airy loft and spread out to dry. There it is raked over twice a day to facilitate the drying. If left in bags, or not stirred often when spread, the mass may become heated, thus destroying the germinating power. When thoroughly dry, it is bagged and ready for winnowing. Beet seeds are sometimes threshed out by striking the stalks against a large rock placed over a barrel. This is done while the stalks are damp, because if thoroughly dry, they are very brittle, and fragments of stock will mix with the seed, which adds to the work of cleaning it. The seeds of squash, pumpkin, cucumber, melon, and tomato, require water treatment, in the cleansing. Those of the cucumber and tomato have a sticky coating, which requires a degree of fermentation to remove. This process occupies from one to ten days to effect the cleansing, which also involves at the last a current of water upon the seeds, which are placed in a sieve, and the gelatinous matter is forced through the meshes with the stump of a broom, until the water passes off without froth or any whitish color. The seeds are then spread out thinly — in the sunshine, if possible — to dry, and must be stirred twice daily. Tomato seeds being heavier than water, sink, while the rest of the fruit floats. They are cleansed in sieves placed in a tub of water. The first sieve allows the seeds to go through it; the second sieve

retains the seed and lets the sand through; after thorough washing the seed is freed from water and spread upon a clean floor to dry. Squash and pumpkin seeds are not fully grown when the fruit is gathered, but continue to grow until they have absorbed the most of the entrails — the stringy pulp in which they are imbedded; for this reason the seeds are much better and more easily cleansed later in the season. After their removal from the fruit — using a short-handled, stout spoon for this purpose — they may stand a day or more to allow the enveloping mass to soften. Then churn the same in water, and force them through a coarse sieve. A thorough churning in a revolving churn will complete the cleaning, and after rinsing and draining in sieves they should be spread one deep upon cloth-covered racks placed six inches apart in frames.

All seeds are winnowed before packing for market, and most sorts require hand picking besides. The common winnowing mill may be used, but requires numerous screens of finely graded sizes of mesh to meet the needs of all varieties. The seed grower on a large scale has for peas a tall chimney, with pockets attached to the sides of the flue. The seed is poured in at the top, and by forcing a strong current of air up from the base, much of the lighter, poorer seed are blown out of the clear space and are caught in the pockets. Onion seed may be put into water, when the poor seed and motes float on the surface and are easily removed, after which the seed is dried and winnowed.

After cleaning, tests for vitality are made and if the per cent is too low it is again winnowed, and the process is repeated if necessary until the right percentage sprouts.

Seed Corn.— When the centre shoot in the spindle curves, like a bent finger, the field corn has begun to glaze and the stalk having no more nourishment for it, the kernels getting all their remaining nourishment from the cob, the ears can be broken off and dropped between the rows, leaving the stalks in an excellent state for the silo or drying. With twice turning while on the ground the ears are soon ready for husking, when the largest, smallest cobbed, and best filled are selected and spread one or two deep, either on floors to be turned every day, or one deep on open-work frames of laths, until the cobs are brittle, which indicates that the seed is thoroughly ripe, when it is shelled, winnowed, sifted and bagged. Sweet Corn requires more labor and care. The

early sorts, of which the Cory and Minnesota are types, are handled in the same way as field corn, with the exception that they are bagged and carried to the seed house to be husked as soon as gathered from the stalks. Varieties that are late for any locality, as soon as the kernels are fully grown have the husks stripped down, but not torn from the ears, while the stalks are yet standing in the field, to give them a fortnight's exposure to the sun before gathering. When gathered, after husking they are either spread as long as the weather will permit, on frames, or on floors, two deep in well aired seed houses, and turned daily. By the use of carpenter's horses several openwork floors are made one above another, with just sufficient space left between to permit a person to crawl on hands and knees and turn the ears. The drying house must have its sides all openwork, for no ordinary barn, however well windowed, will admit sufficient air to keep the ears from moulding. Very green corn may be saved by putting it on lath frames supported just below the ceiling of a room artificially heated.

Carrying Seed Stock Through the Winter.— Cabbages it is usual to bury. First, plow a furrow, going and returning with a large plow, and throw out soil to six inches in depth. Take off some outside leaves and set the plants in the furrow. Plow a second furrow, and throw soil from it, with shovels, on top of the first row of plants. Set another row of plants and so proceed. Rows can be set each side of the first row, and repeat. The soil thrown out covers the plants four inches deep. Lastly, plow a furrow all round the bed and against it, and a branch furrow also for drainage. When the covering soil is frozen hard enough to bear up a man, cover with two inches of forest leaves — oak is the best kind — then lay from six to ten inches of meadow hay, covering down to the ditch. Branches trimmed from trees should be laid on the hay to hold it. Onions are best stored in a dry, cool cellar in bins, or on shelves about ten inches deep. They may be placed in an outbuilding in a heap eighteen inches high and frozen. In such case cover with meadow hay fifteen inches thick, both top and sides, and leave till opened for planting. Most will come out sound but will yield one-quarter less crop of seed than if not frozen. Beets are easily wintered either in outdoor pits or in the cellar, care being taken to keep from freezing or drying. Two feet of earth, with corn stalks on top of the beets will protect them when buried outside. Carrots must be kept cool or they will rot. Sprinkle sand

among them and cover with the same. As good a way probably, as any, is to plant them so late that they will not get over-ripe and then put them in trenches of two feet in depth and not over eighteen inches wide, covering with sufficient straw and soil to keep out early freezing and adding two feet of earth when the season for very cold weather arrives.

The Subtractions.— Onion seed are subject to attack from thrips and two forms of blight of a fungous character; one attacks the stalk and the other the seed heads. The crop may be exceptionally promising up to within a week of its ripening, when either of these blights—that which attacks the stalk is much the more common—may nearly ruin it.

Cauliflower seed is one of the most difficult and uncertain of all seed to raise. The same number of plants which of one variety gave me sixty pounds of seed, of two other kinds cultivated in the same locality, an island near the Marblehead shore, manured and fertilized in the same way, gave me but little over a great spoonful each. In these cases it was not because the heads were small or feeble, for some of them were of enormous dimensions, being much larger than the largest I have ever seen exhibited at our annual fairs. As the heads matured they rotted instead of sending out seed shoots.

Other subtractions from the profit of the seed grower might be added, such as the loss by injury to the seed from the decaying of squashes and all that class of vegetables, but what I have detailed will suffice to show that the seed raiser has to learn not only the subtractions which he has in common with the farmer in raising all vegetables for seed stock, but other and additional losses which are peculiar to his own business.

Seed raising and saving is not all smooth sailing. The covering for cabbages sometimes proves to be too heavy for a warm winter, causing sprouting and rotting of the heads before it is safe to plant them out; or too light for a very cold winter, in which case they are frozen through the stumps and so ruined for seed purposes. If they have been frozen through the stump the fact can be detected by the presence of a ring of dark color when the stump is cut transversely. The head may be in good market condition, and send forth sprouts, yet such will invariably rot below the head as the season advances, and ultimately die. Fifteen or twenty years ago the thermometer, with no snow on the ground, fell

several degrees below zero in March, and so continued for three days, the wind all the while blowing a gale. As a consequence there was no cabbage seed raised in New England that season. What was in the market brought ten dollars a pound at wholesale. I have personally reason for remembering the event for I lost 20,000 heads in a single bed. After the cabbages are planted out the ends of the sprouts are liable to be nipped by late frosts, the result of which is to make a growth of branches starting low down and getting top-heavy and breaking off as the season advances. As the seed matures the seed birds claim their share, which is sometimes a large one. I have dreaded inroads from English sparrows, but thus far, though seed-eating birds, as is evident from their short, strong bills, have lost but little cabbage seed by them. Millet seed they claim a monopoly of. Parsnip seed, when near ripening, is oftentimes attacked by a web worm which soon ruins the crop if it is not sprinkled with air-slacked lime. Perhaps some of the new insecticides would be as efficacious.

Beans, especially of the White Wax variety, are very likely to be attacked by the fungus popularly called the rust. This first attacks the pods and works through to the beans themselves, not injuring their vitality but giving them an unsightly appearance. If they are sufficiently matured to allow them to be pulled as soon as the fungus appears on the pods, the beans can thus be saved from injury. The bean weevil is working his way north and begins to make serious trouble in some localities. Peas are also troubled with these weevils, but by the use of bi-sulphide of carbon they can be destroyed while yet too young to injure the peas for seed purposes. Late planted peas and those raised far north are almost exempt from their ravages. In raising peas for seed it will not do to manure too highly, as this may produce in some varieties a second or even third setting of pods, which will make the picking of them over very costly. I have paid sixty dollars for the picking over of as many bushels. Lettuce is a difficult seed to raise near the sea-coast, where it is very apt to blast. Carrots are a hard seed stock to keep. They cannot be pitted like beets for they will heat and rot; if kept in cellars they are apt to dry hard or again rot. If piled wood fashion, they will usually, but not always, keep well, and the same may be said of them when laid lengthwise in open and nicked barrels.

Seed raising on a large scale, and at the low prices caused by keen competition, will let down the bars of carefulness, and in order to make a living profit, the seed-grower will be compelled to raise his seed with little care for purity or quality of stock, isolation in growth, or the care necessary in the drying to preserve its generative power. Hundreds of careful field trials of so-called Danvers onion seed have demonstrated the fact that in the general stock of seed in the market there is more or less of red and white onions, while in shape they are of all grades, from the round Danvers down to the flat Strasburgs; and although there are some excellent exceptions, there are very many thick necks and scullions. Such results accord with the experience of the leading vegetable dealers in Boston markets. They will also tell you that the best onions in the market are raised between Boston and Newburyport. There is no branch of agriculture or horticulture in Massachusetts that needs more encouragement than does seed growing. As a business in New England it is fast being extinguished, or is removing to the West. The large firms which used to grow all their seeds in New England have either gone West, or, if still here, have the largest part of their seed raised at the West How can it be otherwise? How can we, at their prices, compete successfully with their richer soil, and cheaper labor — for the field work there is largely done by females, or, as in California, by cheap Chinese labor. By better selection from stock grown on land not so rank as the rich soil of the West, New England still claims superior excellence for her home-grown seed. There is no such exhibition of fine vegetables made at any fair outside of Massachusetts as is yearly shown in the rooms of this Society; but they are not raised from Western-grown seeds. It is possible that the Society may continue to have its exhibitions of fine vegetables without lifting a finger to encourage the raising of home-grown seed, because so many of the exhibitors raise their own seeds. But ours is a State and not merely a Boston Society. The agriculturists of the State at large must depend on Western seed, if home-grown seed cannot be obtained. The Society now generously encourages the raising of fine vegetables. Why should it not encourage the raising of good seeds, which are necessary for the growing of fine vegetables?

The announcement for the next Saturday was a paper on "Vegetables Under Glass," by William D. Philbrick of Newton Centre.

MEETING FOR DISCUSSION.

Saturday, March 24, 1894.

A Meeting for Discussion was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair. The following paper was read by the author:

Vegetables Under Glass.

By William D. Philbrick, Newton Centre.

The art of forcing vegetables is a very old one; indeed, it is older than that of glass making. We are told that the gardener of the Roman Emperor Tiberius knew how to gratify the luxurious taste of his master by supplying his table with cucumbers throughout the entire year; and that they were forced during the winter season by growing them in baskets of fermenting manure covered with loam, and protected at night by removing them under shelter of some building, but in the day time they were sheltered under very large plates of talc or mica. This is the earliest account of a hotbed of which there is any record, and dates at the second century of our era, when glass was very slightly known as a material for windows, if, indeed, it was used then at all for this purpose.

Comparatively little seems to have been done during the so-called middle ages in the way of gardening under glass; such arts did not flourish under the bloody wars and savage habits which prevailed in those times. But we read of a shelter built by one Solomon de Caus at Heidelberg, Germany, in 1619, for storing orange trees during the winter. It was built with glass sides but was covered with an opaque roof, and nothing is said about any artificial method of heating it. A greenhouse for growing fruit trees was built at Chelsea, in England, about 1664, with glass sides and opaque roof, and a similar structure was erected at New York in 1764.

But the general use of the hotbed and greenhouse for forcing vegetables, fruits, and flowers, out of season, is a comparatively recent practice, and except in the gardens of the wealthy very little of such work was done till within about fifty years.

At present, as every one knows, their use is almost universal, and no gardener, of howsoever humble pretensions, attempts to

get along without at least a hotbed, while in the large market gardens the glass is measured by the acre.

The hotbed, being of simpler construction than the greenhouse, was used by gardeners earlier than the greenhouse, and even now has many advantages in the spring of the year, especially in growing plants for setting out in the open air; the ease with which the bed can be freely aired, or on fine days exposed entirely to the open air, by removing the glass, is a point not to be attained under the permanent roof of the greenhouse.

Boston gardeners have for about fifty years grown lettuce for the New York market, and even now it is probable that more than half of the lettuce grown near Boston is consumed in the great metropolis. At first it was grown only in hotbeds, and gardeners seemed to think that it could not be grown of good quality unless within a few inches of the glass; but about twenty-eight years ago some of the gardeners of Newton and Belmont began to experiment in building greenhouses, being forced to this by the scarcity of horse manure, which was used by the Arlington gardeners in great quantities for their hotbeds; indeed at this time the number of hotbeds on many farms was limited only by the amount of manure that could be bought. The price of manure was then about six to eight dollars per cord in Boston; at present it is worth from one dollar to nothing at all. Hotbeds, however, have not entirely gone out of use; indeed there are probably more of them used now than ever before; but much the larger part of the increase of glass for vegetable growing during the last twenty years, has been in the construction of new greenhouses.

Hotbeds. — The construction of hotbeds, as described in many books on gardening, is a much more expensive method than is at all necessary, or than is followed by most practical gardeners. There is no need of using nearly so much "heat" as the books usually advise, and a bed sunk in the ground so that the glass shall be only a few inches above the general surface, is far easier to build and to manage, than one heaped up two or three feet high, as is often advised in the books.

The hotbed is usually built in November. The location selected should be well drained, with a nearly level surface; if it slopes slightly to the south or south-east it will be better. The work is commenced by building a tight board fence, six and a half feet high, running nearly east and west. The posts for the fence are

usually set slanting about one foot from the perpendicular, so that the mats, shutters, or sashes may be leaned up against the fence, when working the bed, without danger of being easily blown down by the wind. The land south of the fence is enriched with a good dressing of fine manure or chemical fertilizers; then plowed and harrowed till thoroughly fine, and graded so that the surface shall slope a little from the fence, and be nearly level from end to end of the bed. The planks which are to form the sides of the frame are then put in place; the plank for the north side being of two-inch by twelve-inch pine, spruce, or cypress; the plank for the south side two-inch by ten-inch stock. The north plank is set two feet from the fence, the planks being held in place by stakes one inch by three inches, driven into the ground with a heavy maul, upon the outside of the plank, and nailed to the plank. The plank on the south side of the bed must be set exactly six feet — outside measure — from the wider one on the north side, and carefully adjusted so that its upper edge shall be about four or five inches lower than that of the north side, which will give sufficient pitch to the glass.

The frame will need braces across the bed once in about ten feet to keep the planks from springing. The earth should be banked against the outside of the planks to within about five inches of the top. Before the ground freezes much, the whole should be covered with straw, eel-grass, or coarse manure to protect the inside from freezing till such time as the bed is required for use, which is usually at a season when everything outside is frozen up pretty solid. Sometimes when the bed is to be used early in the winter it is simply protected by placing the glass and shutters over it. Whenever it is desired to work the bed, the covering is stripped off, and the loam thrown out to a sufficient depth to admit the "heat" with its covering of loam, and still leave room for the plants under the glass. The nature of the plants to be grown, and the season of the year when it is to be done, will regulate the depth to which the bed must be dug out. For early winter work, and for cucumbers, a strong heat of from twelve to fourteen inches of hot dung will be needed, covered with six or eight inches of loam, and this will require the pit to be dug out about two feet or two and a half feet below the top of the frame. For later in the season a "heat" of from six to eight inches, will usually be found quite enough. When beds are care-

fully made, and the "heat" is of uniform quality, they work very well, and in skillful hands produce excellent crops, especially in the latter part of winter and in spring; but for all-winter work the greenhouse is far preferable.

As I said before, it is now about twenty-eight years since some of the enterprising gardeners of Belmont and Newton began to experiment in building greenhouses for growing lettuce. The first houses were built of hotbed sashes, the experimenters having so little confidence in the success of the plan that they were unwilling to risk a permanent roof, which could not easily be pulled down and used again for hotbeds. It was then the common belief that lettuce must be grown within a few inches of the glass, and the houses were built low, with just room enough above the beds to work them, and with the roof almost as flat as a hotbed. It was soon found, however, that lettuce equally good grew at several feet distant from the glass, and that it was better to give the roof more pitch in order to shed snow and rain. The houses now built for this purpose have a pitch of from twenty to twenty-five degrees, and some of them are four hundred feet long and fifty feet wide, with a ridge twenty feet above the beds. It is found that these houses are far better than hotbeds for winter growing of lettuce and cucumbers, and the increase of glass during the last five years has been chiefly in the line of greenhouses, while not a few additional houses have been covered with old hotbed sashes. The permanent glass roof, however, is preferable unless it is desired to remove the roof during spring or summer to work on the beds, as is still practised by some gardeners.

The amount of glass used for forcing vegetables, within ten miles of Boston, is at present probably about fifteen acres, and of this rather more than half is in greenhouses; nearly four acres are to be found on one farm, that of Mr. Warren W. Rawson of Arlington.

I have little to add to the excellent lecture you have recently listened to from Mr. Burnham on the construction of greenhouses; the preference seems to be just now for glass about eighteen by twenty-four inches and cypress lumber sash-bars, supported by iron pipe for posts. In large establishments, steam has decided advantages over hot water for heating.

The large establishments keep a night fireman to tend the boilers, burning bituminous coal, which not only is cheaper but

will produce more steam per ton than the anthracite. To be worked economically, the fire should have a strong draft, and be frequently tended. It is a mistake to suppose, as many do, that a dull, slow fire is economical, for the coal is imperfectly consumed in such a fire, and nearly half of its heating power goes up the chimney as carbonic oxide. In small establishments, however, where the saving in coal will not pay the wages of a night fireman, it is necessary to burn anthracite and burn it slowly.

The chief advantage of steam over hot water consists in the ease with which the heat can be distributed just where and when wanted. One of the best illustrations of this point that has come under my notice is at the farm of Mr. E. N. Pierce, of Waverly, where six large greenhouses are heated from one large boiler, by means of 8,800 feet of one and one-quarter-inch pipe, branching from a four-inch main. In this case the boiler is worked under a pressure of about ten pounds of steam, and is set at a level of about forty feet below the highest house, and about twelve feet below the lowest one, so that the water from condensed steam in the radiating pipes returns to the boiler by gravity. The fireman sleeps in a room over the boiler, which is provided with an electric alarm that wakes him whenever the pressure of steam goes below ten pounds per inch.

In planning for steam heating, it is very important to have the boiler set at a level low enough to drain the water promptly from the radiating pipes, bearing in mind that the friction of the steam in passing through a long system of circulation, together with the condensation, will reduce the pressure, so there will often be several pounds difference in pressure between the flow and return pipes; therefore the boiler must be set low enough to balance this, or the water will accumulate in the pipes and they will cease to radiate heat. Two feet head of water will balance about one pound difference in pressure, and it is desirable for this reason to have at least four or five feet difference of level between the lowest heating pipes and the boiler. But no exact rule can be given, since much depends on the size of the pipes used, their length, and the consequent reduction of pressure. A good sized main steam-pipe will do much to favor good circulation, and if it radiates more heat than is wanted it can be wrapped with felt. Much of the difficulty encountered in steam heating is due to ignorance, or neglect of the principles above stated.

The vegetables mostly forced for market at present are, in their order of importance, lettuce, cucumbers, radishes, dandelions, beets and beet-greens, parsley, mint, and cress. Mushrooms are also largely forced, but not under glass; dark pits are used for this purpose.

Lettuce is by far the most largely grown and used of all the forced vegetables. Most of the greenhouses produce two or three successive crops of lettuce each winter, followed by a crop of cucumbers in spring and summer.

The immensely increased use of lettuce and other forced vegetables has kept pace with the supply until this winter; the general depression of business, with a large number of unemployed men who usually buy such delicacies when earning good wages, together with the unusually good condition in which southern lettuce has arrived in the New York market, has combined to force the price temporarily below the cost of production. But a reaction has already begun, and it is not unlikely that there will be seasons of scarcity and high prices in the future, though it is hardly probable that the average prices will be as high as heretofore. And it is not desirable that they should be; for there is nothing that contributes so surely to the health of a family as a liberal use of freshly grown salads, and they should be sold at prices that will bring them within the reach of people of moderate means. At all events let us hope that the increased use of lettuce and cucumbers is not an index of debasing luxury, such as caused the decay and ruin of the Roman Empire, but is a sign, rather, of the appreciation among the common people of the healthful effect of the free use of fresh vegetables.

The care of greenhouses and hotbeds demands constant attention, especially the greenhouses. One of our humorous market gardeners once said, in enumerating the advantages derived from them, that they furnish a safe retreat at night for the head of the family, during periods of domestic strife; and also a convenient excuse for staying away from church, since they always need airing at the time of morning services. Joking aside, they certainly demand most constant attention both day and night for seven days of every week, and a little neglect will quickly convert a promising and valuable crop into a sickening mass of frozen or scorched rubbish.

But for those who love to watch and care for growing plants there is an indescribable fascination in raising them at a season when all Nature without is locked up in snow and ice. I imagine that this pleasure is quite independent of the supposed profit of farming under glass, and, in many cases this year, is the only reward on which the owner can depend with certainty.

There are some difficulties in the way of gardening under glass which can only be overcome by constant care and watchfulness; and others that are imperfectly understood, and demand further study by men of science and practical experience.

Among the difficulties which may be overcome by care, the most common are maintaining a suitable degree of temperature and moisture for the plants in question; a simple thing enough to state and to give directions for, but in our fickle climate a most difficult task to accomplish without a night watchman; and who shall watch the watchman? Few greenhouses are provided with heating apparatus sufficient to carry a proper heat for eight or ten hours during a blizzard without attention; and a sudden fall in the outer temperature of twenty or thirty degrees during the night will often cause destruction with the unwary. And with some plants too high a temperature is quite as injurious as too low, and overheating is almost as common a fault in their management as any other.

Among the difficulties that are as yet imperfectly understood are the treatment of insects and fungous diseases. The aphis is a very destructive pest in greenhouses and hotbeds; it thrives best in a rather warm temperature, and attains its best development when fed upon good lettuce and cucumber plants. The best remedy is careful and frequent smoking with tobacco, and for this purpose I have found that the fine tobacco dust furnishes a safer and more manageable smoke than the stems or leaves.

Another class of pests that we know less about are the various mildews and rots of the lettuce and cucumber plants. In general the best way to fight them is to begin with clean plants and a clean house; the plants being grown in fresh loam, in a hotbed where none of the same species have lately been grown. Before setting the plants, fumigate the vacant greenhouse with a strong sulphur smoke, which will kill every living thing; and after setting them keep them growing vigorously in a congenial heat and moisture. Stunted and unhealthy plants are far more

subject to injury by both insects and fungous diseases than those in healthy growth.

A good crop of both lettuce and cucumbers is usually grown in a new greenhouse the first year, but the succeeding crops are far more subject to disease. This suggests the importance of the system of rotation of crops, where it is possible to adopt it, in order to avoid the spores of fungi, which rapidly accumulate in the soil and surroundings where repeated crops of the same vegetable are grown. This is not always easy to accomplish, the great demand for forced lettuce obliging the gardener to repeat this crop often.

Discussion.

Benjamin M. Watson, Jr., inquired concerning the arrangement of pipes for heating.

Mr. Philbrick replied that, under the impression that cucumbers and lettuce required bottom heat, the pipes were at first placed under the beds. Three objections to that arrangement were soon manifest; first, that the pipes dried the soil too quickly; second, that the pipes so placed failed to heat the air in the house sufficiently; and third, that the benches soon decayed. Therefore it was decided that the pipes must be either in the alleys or overhead, and the beds built upon the ground.

Mr. Philbrick added that certain vegetables can be grown together successfully, but he prefers to grow only one kind at a time in one house. Amateur gardeners, however, often wish to grow several vegetables together. Dandelions will thrive in a temperature of 40° at night; lettuce from 45° to 50°. Yet dandelions, lettuce, and radishes can be grown together easily. Cucumbers require more heat; still, in their younger stages of growth, radishes or beets may be grown with them; but when they begin to bear fruit they demand so much more heat, as well as more room, that radishes cannot succeed. Tomatoes, like cucumbers, must have a high temperature. In growing strawberries and cucumbers under glass, one great difficulty is in fertilizing the flowers. If bees are about the premises they will perform this work for cucumbers, but otherwise hand-fertilization will be imperative. Lettuce will head when the temperature runs up to 80° in the sunshine; but high temperature at night must be guarded against. Lettuce is also liable to be burned at 80° temperature in the day-

time, but this can generally be prevented by wetting down the paths; in doing this, however, care must be taken not to wet the plants; they must never be wet when the sun is shining hot upon them. In watering these plants, it does not matter whether it be done in the morning or the afternoon, provided the water is quickly dried off the plants. When a new bed for a crop of lettuce has been prepared in a house, it should be thoroughly wet down three or four hours before planting, but the soil should not be muddy when the plants are set. After the planting is completed give a light watering. Where a bed is built two or three feet high, with an air space beneath, it requires more watering.

In preparing a hotbed to start a lettuce crop in December, there should be a foot and a half of hot dung put in for the necessary heat. In January the circumstances are very different, and one foot of dung would suffice. The amount and frequency of watering would depend largely upon the weather.

Samuel Hartwell spoke of a greenhouse, five hundred feet long, devoted to forcing vegetables, which has been run four years without a change of soil. Some of the plants in the last crop were blasted.

Mr. Philbrick said that a new greenhouse could sometimes be run three or four years — sometimes only one year — without trouble from fungus, where the same soil is used continuously; but, as a rule, in all such houses crops will sooner or later begin to fail. If fungous diseases do not appear, insect pests are almost sure to do so. Generally it is necessary to take out the old soil to the depth of about six inches and replace it with fresh earth, when rotation of crops cannot be practised.

Mr. Hartwell asked what insects most generally infested such greenhouses.

Mr. Philbrick replied that the most generally troublesome insects are the aphis, the red spider, and the cut-worm. Fumigation with tobacco will usually prove a remedy for the aphis. For the red spider, wet down the plants as often as it can be done safely. The cut-worm is active at night, and by going around frequently in the evening, the gardener can find them at work and crush them.

John Parker suggested the use of a ring of stout manilla paper, or of wood, made large enough to pass over the plant and rest on the ground. No cut-worm will cross it to the plant.

Mr. Philbrick asked if the worm would not crawl under the ring.

Mr. Parker said that the ring or hoop must be pressed down into the soil, which will prevent the worms from crawling under it. They will not crawl over any surface except earth or stone. The ring may be made of tin or any other metal if desired. He had found that if three thin pieces of wood — such as shingle, cigar box, or any other thin stock, cut one and a half inches wide by six inches long — are set on edge in triangular form, around a plant and sunk half an inch into the soil, with earth pressed against the lower part of the outside, they will serve nicely as protectors and can be used year after year for that purpose. If, however, the worm lies buried within the ring or the wooden triangle, of course it can come up and work destruction as though no such guard were there.

The Chair announced for the next meeting a paper on "Horticulture at the World's Columbian Exposition," by William J. Stewart, of Winchester.

MEETING FOR DISCUSSION.

Saturday, March 31, 1894.

A Meeting for Discussion was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair. The following paper was read by the author:

Ornamental Horticulture at the World's Columbian Exposition.

By William J. Stewart, Winchester.

For the pen, the brush, and the camera, the World's Columbian Exposition furnished a fruitful field. Through these agencies the country has been flooded with thousands of pictures and hundreds of thousands of printed pages, until those magnificent structures and their environs seem almost as familiar to us as the domed building on our own Beacon Hill. The World's Fair lecturer, too, has been abroad in the land and it would appear as though little remains to be said that has not already been recounted until

people are well-nigh wearied of the subject. But, on perusing the pages of a certain much-heralded work on the World's Columbian Exposition and there finding under the subject of Floriculture, "twenty Azalea Mollis all in pink and white, flowering in June" recorded as one of the most notable exhibits, and the further interesting information that "Roses were planted six inches deep on account of the little root they had on arrival," one is forced to the conclusion that possibly there may still be found in that department something as yet unchronicled but well deserving of our thoughtful consideration.

The domain of Horticulture is today too broad and too comprehensive to be treated as one subject, even if one had the requisite experience in all its departments. Its great subdivisions, pomology, viticulture, market gardening — all well illustrated at Chicago — each a noble industry in itself, with its own peculiar conditions and special interests — have, with the exception of their direct dependence upon the soil for existence, little in common with that horticulture which ministers to the artistic perceptions rather than the physical necessities of mankind, whose cultivation exalts and ennobles the mind as no other art ever can, and gives to Horticulture its strongest hold upon the hearts of our people. Horticulture without Ornamental Horticulture would prove but a feeble attraction.

Ornamental Horticulture is the only horticulture with which I am familiar, and to the consideration of that subject I have confined this brief paper, purposely avoiding the infliction upon you of a detailed list or description of the exhibits at Chicago or statistics of any kind.

As illustrated at the World's Fair, Ornamental Horticulture may be considered, first, in its capacity as an indispensable feature of the equipment of the grounds and buildings;

Second, as illustrating the varied horticultural attractions, resources, and industries of countries and states remote from each other and widely differing in climate and topography; and

Third, as offering an opportunity for individuals and firms engaged in horticultural pursuits, to exhibit to the world in friendly competition the results of their labors.

Under the first heading properly belongs the landscape work. Without the aid of the landscape architect in designing and locating, and the gardener in adorning, those beautiful buildings —

triumphs of architecture as they were — would have lost much of their impressiveness. It was the magic of our great landscape architect that made the setting for all those jewels; that brought them into harmony and united them with subtle skill into one great and almost perfect whole. I say "almost perfect" for one could not help regretting that while Horticulture was recognized in part, to the extent of beautiful lawns, yet in the planting the finishing touches were missing, and it was evident that some one had forgotten that floral adornment is just as necessary in such a picture as green lawns and picturesque lagoons. This omission was painfully apparent in that otherwise charming feature, the Wooded Island. The design and conception of the rose garden here was a grand thing, and the general planning of beds and paths good, but in the treatment of its shores, color was the one thing lacking. There are schools of painting that indulge in absence of color; nevertheless color has a place in art. It exists in Nature and is always pleasing in the landscape. But whatever individual preferences may be, it is not too much to claim that in a World's Fair all schools of gardening should have had an opportunity. The decoration of the Wooded Island with colored lanterns at night was in questionable taste. The best that can be said of it is, that its artificial effect suited well for holiday purposes, and made an impression by appealing to the love of the spectacular.

Horticultural Hall next claims our attention. An ill-appointed structure, unsuited for the purpose it was supposed to serve, its principal claim to notice was that it was the biggest thing of the kind on earth. This building should not have been constructed without the best horticultural advice obtainable. In any event its central apartment should never have been allotted to competitive exhibits, but its decoration and furnishing should have been done and paid for under Department control as a part of the general adornment, in the same manner as the landscaping, lighting, or painting.

The management, having disregarded the oft-repeated warnings and entreaties of practical horticulturists regarding the necessity for giving to this section a full year's start ahead of the other departments of the Fair, found themselves confronted with an immense building and little to put in it. A loud appeal for help was then made. Massachusetts helped a little, but it was mainly through the efforts of New York and Pennsylvania that a present-

able appearance was finally secured. The horticulturists of these States applied for and received the share, to which they were fairly entitled, of the liberal appropriations made by their legislatures, and then took hold with a will to help out the management. Can any words of condemnation then be too severe for the neglect of proper supervision, the bad judgment, the ingratitude, which, after the hall had been filled, largely through the generous action of distant States, permitted it to be desecrated by cheap lemonade stands and peddlers of knickknacks, soap, and candy?

Let us now consider the displays made in the name of the various States and foreign countries. Unfortunately but few of these were worthy of passing notice. The West did almost nothing; Illinois, which should have been first, was conspicuous by the absence of any respectable endeavor on her part, the surroundings of her State Building, even, being a most miserable attempt. Outside of New York and Pennsylvania, no State exhibit of any great pretensions was made. Between these two there was a strong effort for supremacy. The character of the exhibits made by these states, many of the plants contributed having been cultivated within their borders for the past forty years, showed that for a generation, at least, horticulture has had a strong foothold there, and their public spirited action is entitled to all praise; and of Ontario's exhibit this may be said with equal truth.

But I believe that the principle followed in these instances was not the best. Suppose, that instead of Japan's faithful representation of native gardening processes, Mexico's curious cacti, New Zealand's wonderful tree ferns, and Holland's grand collective exhibit of hardy azaleas and rhododendrons, these countries had contributed merely a diversified exhibit of greenhouse plants, what a loss in interest and educational value the horticultural department would have suffered. The enterprise and rivalry of individuals engaged in the trade might safely have been depended upon for miscellaneous displays of plants, from all quarters of the globe, but States should have taken advantage of the opportunity to set forth their own native resources and localized industries. What an exhibit Massachusetts might have made, for instance, with a naturally planted collection of her native flora. A bit of meadow, a rocky hillside, gay with innumerable species of shrubs and wild flowers, from the first pussy willow and hepaticas of

spring time, all through a range of floral loveliness that for variety and beauty can be excelled nowhere, down to the last purple aster of autumn!

If you would learn whether the people are interested in such things, look over in that further corner of this hall any Saturday afternoon next summer, and see them crowd about the little wild treasures collected from the woods and fields. Let the display of roses, orchids, and lilies be ever so gorgeous, you will always find that corner holding its own.

It may be asked whether the advocacy of such a course is not detrimental to the interests of Commercial Floriculture. I say Floriculture will never suffer because a love of Nature is inculcated by her followers. The only reverses ever sustained by Commercial Floriculture have been when it has shown a tendency to part company with Nature and drift into paths of excessive artificiality.

> "This thou shouldst know, who from the painted feature
> Of shifting Fashion, couldst thy brethren turn
> Unto the love of ever-youthful Nature,
> And of a beauty fadeless and eterne."

In the old fashioned garden connected with her State building Massachusetts rose to the full height of her opportunity. This was one of the gems of the Fair. It was, as Mr. W. R. Smith truly said, "well conceived and elegantly carried out."

In considering the competitive displays in the different classes, the first point claiming our attention is the provision made for this department. As before suggested, the various buildings intended for these exhibits should have been constructed with direct reference to their future contents, but they were not. Had this been done, we should have been spared the painful sensation of seeing rare and delicately reared tropical specimens, gradually chilling to death from standing for months on the cold floor under the same roof and in the same atmosphere with tough, hardy and half-hardy plants. The exhibitors on the Wooded Island were well provided for while the spring weather lasted, but the porous soil of which this artificial ground was of necessity constructed, and the shameful neglect of proper provision for watering during the hot summer season, made havoc with the herbaceous plantings at the time of the greatest attendance of visitors. Nevertheless, the Wooded Island was a most attractive spot, and through its

influence the use of hardy plants in gardening must have received a great impetus throughout the West.

A few of the individual exhibits which were of superlative merit were Pitcher & Manda's magnificent display of decorative plants; the cannas from Dreer, Vaughan, Pierson, and Craig; the cacti from Blanc; the rhododendrons from Moser and Waterer, the last including a most instructive collection of seedlings, and the fancy caladiums from Rio Janeiro, which were a revelation. In general the irises, pæonies, campanulas, poppies, pansies, azaleas and other outdoor displays on the Island in the early months were wonderfully fine. The opportunity given to the seedsmen for the competitive exhibits of florists' flowers, including cyclamens, cinerarias, primroses, and calceolarias, was taken full advantage of, and although sharply criticised at the time, proved to be well worth all it cost, for it attracted many thousands of visitors to the grounds before the Fair proper was opened, and the exhibits were of the highest merit, clearly demonstrating the marvellous results possible from close attention to the development and improvement of specialties. It is much to be regretted that of gladioli, which are now exported from this country by millions, the only exhibit of any extent was a foreign one. Tuberoses, another important American product, were scarcely seen. The extensive display of horticultural implements of American manufacture; also the examples of greenhouse construction, heating, and ventilation shown by our horticultural builders, were most creditable, considering the opportunities afforded.

The system of judging and awards at the World's Fair has been the cause of much dissatisfaction, and it is not probable that it will be regarded as worthy of adoption on any future occasion. It sounded much better in theory than it proved to be in practice. The one-judge plan is un-American in principle, and places too much responsibility on one man ever to become popular. The interests of every competitor in an exhibition demand that the chances of an unfair verdict be minimized as far as possible. Against a decision reached after due deliberation by three experts, no protest can have any weight. This question of judging is of vital importance to every society, for unless exhibitors are satisfied that every precaution has been taken to secure full justice they will stay away.

The Columbian Medals are not likely to be valued so highly by their recipients as they might have been had they been less freely awarded, or had they been so designed as to indicate degrees of merit. A medal for a rare and skillfully grown plant or group of plants, loses most of its significance as soon as it becomes known that it differs in no respect from that given for a collection of wire designs, a plant sprinkler, or a wreath of dried mosses. It is true that in the diplomas accompanying the medals, points of excellence in exhibits are carefully noted, but the diploma can never take the place of the medal as an award to be striven for, and it is a question whether it would not have been much better if the time-honored plan of gold, silver, and bronze medals, to indicate degrees of superiority had been adopted at Chicago.

In conclusion, it is pertinent to inquire whether that branch of American Horticulture which we have been considering is today any further advanced than it would have been had the Fair not taken place, and whether a grand opportunity to present our art in its proper light before millions of visitors has been taken advantage of to the fullest extent. Horticulture's grand possibilities never recovered from the unseemly wrangle and delay at the start, and many of the unfortunate features which your essayist has called attention to, at the risk of making a reputation as a fault-finder, were directly traceable to this fact. It is gratifying to note the long step forward made by Ornamental Horticulture in the independent position secured for it as a separate department. In this it sought and obtained nothing more than its just and rightful recognition, which was inevitably bound to come soon in any event. Therefore, while we may regret that much more was not accomplished, yet we should be grateful for what was achieved, not forgetting that mistakes are educators and serve their purpose as well as successes, provided we recognize and honestly acknowledge them as such, and that only in the future can the full results of the great exhibition be justly estimated.

Discussion.

Clarence E. Grosvenor expressed much disappointment in the Horticultural Exhibition at Chicago. That department was far inferior to what was promised. The roses shown at the Paris Exposition greatly exceeded anything seen at Chicago; indeed, the exhibition made by the rose growers of the United States at

Chicago, fell considerably behind our display at Philadelphia, in the Centennial Exhibition.

Benjamin P. Ware said the essayist had remarked that Massachusetts horticulture was but slightly represented at Chicago. He would ask if the Massachusetts Horticultural Society was at fault for that apparent failure? He recollected that Mr. Hovey, of the Massachusetts Commission on the World's Columbian Exposition, came into this hall and delivered an address urging this Society to take up the work of preparing a suitable exhibit of Massachusetts Horticulture in the great Fair at Chicago, in 1893. A Committee was appointed for that purpose, who invited the members of the Society and others to make contributions from their horticultural products, for the exhibition.

The speaker was interested in the work and contributed to the collection which was made, and some of his friends also contributed. Later on, he understood that a difference existed between our Committee and Mr. Hovey, and that the latter had turned a cold shoulder toward the Society. Afterward the several donors of fruit for the State Exhibit were notified that it was not wanted. The scanty horticultural exhibit from Massachusetts was not at all an indication of what might have been furnished by the horticulturists of this State under different circumstances. The meagre agricultural exhibit from this State may perhaps be attributed to the same cause. The Commissioner visited Amherst and arrangements were made with the officers of the Massachusetts Agricultural College, the Director of the Agricultural Experiment Station, and others, to have them furnish contributions illustrative of their work. But after much preparation had been made by them, they were notified that sufficient room could not be furnished for their exhibits. This, however, did not appear at the exhibition, for the space assigned to Massachusetts was not filled. He was proud to know that the landscape architecture of Jackson Park was designed by a Massachusetts man, a member of this Society, and now the head of our Metropolitan Park Commission. During his visit to the Columbian Exposition, Mr. Ware saw very much that interested him greatly. But he felt deeply the reflections which were cast upon the agricultural, and especially upon the horticultural interests of Massachusetts, on account of the failure to make a suitable exhibition of her products in those departments of industry.

Mrs. H. L. T. Wolcott said she was always glad to meet a man who has the courage of his convictions, and finds fault. She had done this for years, and believed in it. She had listened with much interest to Mr. Stewart's criticisms, and she could not but acknowledge them to be largely just. She thought the fact that such criticisms were needed arose from the inertia of the people— the tendency of our own citizens, especially, to put off matters. They think and say as of old: "O don't hurry, it won't be much of a show" — those of old times said "shower" — and they do nothing until it is too late to work effectively. All preparations for the Horticultural Section of the Great Exhibition should have been commenced a year earlier. The plans for the Horticultural Building should have been submitted to practical judges — practical horticulturists, rather than left to architects, whose special interest was only to make an attractive structure, regardless of the needs of the exhibits, of which they knew nothing. This knowledge concerning plants was in possession of the exhibitors, and should have been called for, and made the guide in designing every part of that great building.

The choice of Commissioners seemed to have been made with political influence as the ruling principle; consequently many of them commenced their work without any experience in the lines of duty assigned to them. This was especially conspicuous in the Woman's Department. Most effective displays could not have a place there, because the leaders, or those having authority, were in absolute ignorance of their value. Another illustration was found in the situation of our own State Building, which was an enlarged reproduction of the old Hancock House, formerly so familiar to many of us. That fine old mansion stood on an eminence, with terraced banks of green between the house and the sidewalk on Beacon street. But in Chicago, its site was on the dead level of the prairie, and only a few inches higher than the grand avenue before it; then the training of vines upon its walls and the fence had the effect of belittling its appearance, and dwarfing its grand proportions. One New England state gave the sum of five thousand dollars for its State Building. The owners of the marble beds in that state, desiring to exhibit the fine varieties of stone in their quarries, suggested to the Woman's Commission that they would furnish a marble model of a Pompeian temple, and the offer was accepted. It was a most inappropriate edifice to

represent a New England State! But it seems possible that a similar mistake may be committed one hundred years hence. Mrs. Wolcott made an earnest appeal to those present to be interested early and make their plans in season to be ready to aid in assuring the success of the next great exhibition. As to the planting of the fair grounds of which Mr. Stewart had spoken, she said it afforded her great satisfaction to find that no elephants, or other equally uncouth designs in clipped, colored foliage plants, had been introduced upon the lawns. Although Chicago is a long distance for our decorative planters to travel to make a garden, that part of the work for the great exhibition should also have been commenced a year earlier than it was. Did one competent person take a hand in it then?

Mr. Stewart hoped no one would construe his criticisms of the absence of color in the planting at Chicago, as an approval of elephants or other grotesque designs in colored foliage plants. His remarks had reference principally to the planting of the Wooded Island, where the opportunity afforded for the tasteful use of various grasses, sedges, etc., had been taken advantage of to the fullest extent, but he thought the beautiful effect might have been greatly enhanced by the introduction of hardy flowering plants, in masses of bright color. Some go too far in advocating the absence of color. Nature does not do this.

Mrs. Wolcott remarked that if she could have transported her ditch garden to a similar part of the Wooded Island, she thought it would have proved an attractive success. That Island was made during the winter, and only plants that could endure the winter could be early planted on it. She liked to see and greatly enjoyed the beauty of all varieties of plant colors, but only when the plants were growing in their natural ways and forms.

Thomas L. Harrison asked if Mr. Stewart preferred any colors in particular; if he did not like to see flowers of scarlet, blue, etc.

Mr. Stewart replied that almost any color will harmonize with white or green, provided the surroundings do not interfere. For instance, if one were planting grounds beside a red brick building, scarlet would not do there. The idea that blue will not harmonize with green is erroneous, at least where that green is foliage. Every blue flower is provided by Nature with a setting of green leaves, yet we see no lack of harmony.

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1894.

PART II.

BOSTON:
PRINTED FOR THE SOCIETY.
1895.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

Saturday, April 7, 1894.

A duly notified Stated Meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder in the chair.

A photograph, taken by Augustine H. Folsom, about 1870, of the first Bartlett pear tree imported into this country, which now stands on what was formerly the estate of Enoch Bartlett, one of the first board of Vice Presidents of this Society, on Dudley Street, near Blue Hill Avenue, Roxbury,—and is now owned by the "Little Sisters of the Poor,"—was presented to the Society by Edmund Hersey, in behalf of Mr. Folsom. The thanks of the Society were voted to Mr. Folsom therefor.

Mr. Hersey, as Chairman of the Committee on Large, Old, or Interesting Trees, stated that the Committee were preparing photographs of such trees, to be bound in a book, or books, with descriptions; the whole so arranged that reference could be readily made to any one. The Committee felt that though the Society might not at present be disposed to incur the expense of publishing such a book, which would be considerable, it should have the photographs and descriptions arranged in such form that they could be readily used. The subject was further discussed by O. B. Hadwen, Francis H. Appleton, Leverett M. Chase, and the Chair.

George E. Davenport said that about a year ago the duty devolved upon him of preparing a memorial of Ebenezer H. Hitchings, a valued member of the Society, well known for his love of

native flowers, and his interesting exhibitions of them. Today he had the pleasant privilege of presenting to the Society the Herbarium of Native Orchids, collected and prepared by Mr. Hitchings, —a gift to the Society from Mr. Hitchings' family—and which he hoped would be known as the "Hitchings Herbarium of Native Orchids." On motion of Francis H. Appleton, seconded by William C. Strong, it was unanimously voted that the heartiest thanks of the Society be extended to the family of Mr. Hitchings for the gift, and that it be designated the "Hitchings Herbarium of Native Orchids."

The following named persons, having been recommended by the Executive Committee as members of the Society, were, on ballot, duly elected:

Frederick A. Blake, of Rochdale.
Miss Mary L. Ware, of Boston.

The following named persons, were, on recommendation of the Executive Committee, elected Corresponding Members of the Society:

Cavalière Enrico Ragusa, Palermo, Sicily.
William Watson, Assistant Curator of the Royal Botanic Gardens, Kew, England.
Daniel T. Curtis, Medford.

Adjourned to Saturday, May 5.

BUSINESS MEETING.

Saturday, May 5, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The following named persons, having been recommended by the Executive Committee, were, on ballot, duly elected members of the Society:

E. S. Draper, of Hopedale.
Professor W. T. Councilman, of Boston.
E. Pierson Beebe, of Boston.

Adjourned to Saturday, June 2.

BUSINESS MEETING.

Saturday, June 2, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

John G. Barker announced the decease of John C. Hovey, who had long been associated with other members in the active service of the Society; and moved that a committee be appointed to prepare a suitable memorial of him. The motion was carried, and the Chair appointed as the committee, Charles H. B. Breck, John G. Barker, and Charles N. Brackett.

Dr. Daniel D. Slade, of Chestnut Hill,
having been recommended by the Executive Committee as a member of the Society, was, on ballot, duly elected.

The meeting was then dissolved.

BUSINESS MEETING.

Saturday, July 7, 1894.

A duly notified Stated Meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The President, as Chairman of the Executive Committee, reported from that Committee a recommendation that the Society appropriate twenty-four dollars to pay the prizes awarded by the Committee on Publication and Discussion of 1893, to the Chairmen of Awarding Committees of 1892, for their Annual Reports; and that these prizes be paid by the present Committee on Publication and Discussion. The report was accepted, and the appropriation was voted.

Charles H. B. Breck, Chairman of the Committee appointed at the last meeting to prepare a memorial of John C. Hovey, read the following report:

Whereas, It has pleased Almighty God to remove from the scenes of life our associate and friend, John C. Hovey, who for many years was a most useful member of this Society: therefore,

Resolved, That by the death of Mr. Hovey, after a long and painful illness, the Massachusetts Horticultural Society has sustained a great loss, he having, for many years, been earnest in promoting its welfare, and always taking an active interest in everything pertaining to its prosperity.

Mr. Hovey was elected a member of the Society November 3, 1860, having been proposed by George W. Pratt. He became a member of the Committee on Flowers in 1863, and was its Chairman from 1867 to 1871, inclusive; and was again a member from 1872 to 1877. He was Vice President of the Society in 1878 and 1879. He was a member of the Executive Committee from 1880 to 1885, and from 1890 to 1892. He was a member of the Committee on Vegetables from 1888 to 1894.

Two years ago we did what we could to testify our regard for the memory of the last of the founders of the Society, John B. Russell, and now we have to mourn the loss of one of a family, which, for two generations, has taken an active interest in the work of the Society. Mr. Hovey's death is the first in the second generation of such workers. The example of his faithful performance of his duties for so many years is worthy of imitation by the members of the Massachusetts Horticultural Society.

Resolved, That the members of the Society express their heartfelt sympathy with the mother, sisters, and other relatives of Mr. Hovey in the great loss they have sustained.

Resolved, That these resolutions be inscribed in the records of the Society, and that a copy be sent to the family of the deceased.

CHARLES H. B. BRECK,
JOHN G. BARKER,
CHARLES N. BRACKETT,
} *Committee.*

The report was accepted, and the memorial was unanimously adopted.

The following named persons, having been recommended by the Executive Committee, as members, were, on ballot, unanimously elected.

JASON S. BAILEY, of West Roxbury.
Professor W. M. MUNSON, of Orono, Me.

Adjourned to Saturday, August 4.

BUSINESS MEETING.

Saturday, August 4, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

Agreeably to the Constitution and By-Laws, the President appointed the following named members a Committee to nominate candidates for Officers and Standing Committees of the Society for the next year:

J. D. W. French, *Chairman.*

Samuel Hartwell,	Jackson Dawson,
Arthur H. Fewkes,	Warren H. Manning,
C. Minot Weld,	Varnum Frost.

Adjourned to Saturday, September 1.

BUSINESS MEETING.

Saturday, September 1, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, Vice President Charles H. B. Breck, in the chair.

Samuel Hartwell, from the Committee appointed at the last meeting to nominate candidates for Officers and Standing Committees for the year 1895, read a report which was accepted. It was voted that the committee be continued, and requested to nominate candidates in place of any who might decline before the election.

The decease of Dr. Joseph Burnett was announced, and O. B. Hadwen, N. I. Bowditch, and Benjamin G. Smith were appointed a Committee to prepare an expression of the Society's regard for Dr. Burnett.

The Secretary read a letter from William Watson, Assistant Curator of the Royal Botanic Gardens, Kew, England, acknowledging the receipt of his Diploma as a Corresponding Member of the Society and thanking the Society therefor.

The following named persons, having been recommended by the Executive Committee for membership in the Society, were, on ballot, duly elected:

John P. Spaulding, of Dorchester.
Miss Mary C. Hewett, of Canton.
Charles G. French, of Brookline.
Herbert A. Horton, of Brookline.

The meeting was then dissolved.

BUSINESS MEETING.

Saturday, October 6, 1894.

A Stated Meeting of the Massachusetts Horticultural Society, being the Annual Meeting for the choice of Officers and Standing Committees, was holden at eleven o'clock, Vice President, Charles H. B. Breck, in the chair.

The Secretary stated that the meeting had been duly notified to the members of the Society, agreeably to the Constitution and By-Laws.

Samuel Hartwell, in behalf of the Nominating Committee, reported that the Committee had nominated Benjamin M. Watson, Jr., as Professor of Botany and Vegetable Physiology, in place of John Robinson, who had declined to stand; and George E. Davenport as a member of the Library Committee, in place of Waldo O. Ross, who had also declined to serve.

Agreeably to the Constitution and By-Laws the Chair appointed E. W. Wood, Thomas Westwood, and John M. Kinney a Committee to receive, assort, and count the votes given, and report the number. The polls were opened at ten minutes past eleven o'clock.

While the voting was in progress, the Chairman read a letter from the Pennsylvania Horticultural Society, asking this Society to

contribute to the Chrysanthemum Show of the former Society, on the 6th to the 10th of November, one hundred chrysanthemum flowers in competition for a National Chrysanthemum Trophy. It was voted that the letter be referred to the Committee on Flowers.

The following named persons, having been recommended by the Executive Committee as members of the Society, were, on ballot, duly elected:

Hon. Charles H. Allen, of Lowell.
Oakes Ames, 2d, of North Easton.

The polls were closed at ten minutes past one o'clock, and the Committee to receive, assort, and count the votes given and report the number, reported the whole number of ballots to be one hundred and thirty-six, and that the persons named in their report had received a plurality.

The report was accepted, and the above named persons were, agreeably to the Constitution and By-Laws, declared by the presiding officer to be elected Officers and Standing Committees for the year 1895.

Adjourned to Saturday, November 3.

BUSINESS MEETING.

Saturday, November 3, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, Vice President Francis H. Appleton, in the chair.

The Chairman, from the Executive Committee, presented the following report:

At the regular meeting of the Executive Committee held on the 27th of October, it was voted to recommend to the Society to appropriate the following sums for Prizes and Gratuities for the year 1895:

For Plants,	$2,000
" Flowers,	2,500
" Fruits,	1,800
" Vegetables,	1,150
" Gardens,	500
And a special appropriation for prizes for Palms, etc., at the meeting of the American Carnation Society, in the Hall of this Society, on the 21st and 22d of February, 1895, of	100
Total,	$8,050

The report was accepted, and, agreeably to the Constitution and By-Laws, was laid over for final action at the Stated Meeting of the Society on the first Saturday in January, 1895.

Michael H. Norton, from the Committee on Flowers, to whom was referred the invitation of the Pennsylvania Horticultural Society, to this Society, to compete for a National Chrysanthemum Trophy, read a report that it is inexpedient to enter into such competition as a Society, either at Philadelphia, Denver, or Springfield, invitations having been received since the last meeting of this Society from the last two places. The report was accepted.

J. D. W. French offered the following vote:

Voted, That a committee of five be appointed to consider the correct interpretation of Section VI of the Constitution and By-Laws of the Massachusetts Horticultural Society, and that said committee be authorized to take such legal advice as may be expedient, and to report any irregularity in the manner of voting which may have occurred at the last Annual Meeting. The committee is requested to report on the whole subject at the next meeting of the Society, or at a special meeting called for the purpose of acting on the report.

Mr. French spoke in favor of his motion, and it was opposed by Benjamin P. Ware, William C. Strong, Theodore H. Tyndale, Rev. Calvin Terry, and William H. Spooner. The motion was defeated by a vote of eleven against, to five in favor.

William C. Strong moved that a committee of five be appointed, to consider and report at a future meeting, what changes are

necessary in the Constitution and By-Laws. This motion was carried by a vote of eight in favor, to four against, and the Chair appointed as that Committee, William C. Strong, J. D. W. French, William H. Spooner, Samuel Hartwell, and Augustus Hemenway.

The following named persons, having been recommended by the Executive Committee as members of the Society, were, on ballot, duly elected:

Joshua C. Stone, of Watertown.
Henry F. Woods, of Boston.
William H. Alles, of Hyde Park.
J. Arthur Beebe, of Boston.

Adjourned to Saturday, December 1.

BUSINESS MEETING.

Saturday, December 1, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, Vice President Charles H. B. Breck, in the chair.

The Secretary being absent by reason of illness, the Chair appointed Miss Charlotte M. Endicott, Secretary *pro tem.*

William C. Strong, Chairman of the Committee appointed at the last meeting to consider and report what changes are necessary in the Constitution and By-Laws, stated that the committee were not ready to make a full report. On motion of John G. Barker further time was granted to the committee.

O. B. Hadwen, Chairman of the Committee appointed at the September meeting to prepare an expression of the Society's regard for Dr. Joseph Burnett, presented the following:

By the death of Dr. Joseph Burnett this Society loses one of its oldest and most valued members, he having become a Life Member June 4, 1845. Thus, for a period of nearly fifty years has he been an active member, often contributing fruits and flowers to its exhibitions, and his full share in promoting the objects and interests of the Society.

But Dr. Burnett's life work as a horticulturist and an arborist is especially manifest in his native town of Southborough, where he has embellished the town and his own extensive grounds with both native and exotic trees, largely planted with his own hands, forming not only living monuments to his memory, but objects of beauty that will endure for ages.

Two other enduring monuments to his memory remain in his town; the beautiful stone Episcopal Church, and St. Mark's School; the latter a popular classical institution where young men are fitted for college. By his sunny nature and ever kindly acts, he was a shining example among men; everyone was his friend, and generations of men will be better for his having lived.

As an agriculturist he was a leader, always in advance, keeping the most approved breeds of cattle, and the most approved machinery and implements were used on his farm. Deerfoot farm has a world-wide reputation.

He was respected and beloved by all.

O. B. Hadwen, *Chairman.*

The report was unanimously adopted.

Francis H. Appleton presented the following report:

The Distribution of Seeds, by the Department of Agriculture.

Whereas, More than half a century ago, improved varieties of seed were sent out by the official then in charge of that work at Washington, to farmers and gardeners of the country, in order that such seeds might be tested, and their practical value ascertained, either over others already in use, or as to their value for introduction and cultivation; and

Whereas, We recognize that the present distribution of seeds from the Department of Agriculture does not meet the original intention as herein indicated; and has grown to unreasonable dimensions, and has become a gratuitous distribution of seeds which the recipient is often unwilling to use, the cost of such distribution in 1893 having been $160,000;

We, the members of the Massachusetts Horticultural Society, assembled by our representatives in our Hall, in Boston, *respectfully recommend* to the Congress of the United States, that the present method of, and appropriation for, the distribution of seeds

be abolished; and that in its stead an appropriation be made of sufficient amount ($35,000 suggested), by which the Department of Agriculture can distribute to the Experiment Stations, now located in almost every State and Territory, such seeds as may to the said Department seem wise, and require a report upon the same from the stations; the stations to perform the required work under appropriations already provided for annually.

And we direct that the Secretary send a copy of these expressions to each of our Senators and Representatives, and to the Secretary of Agriculture at Washington.

The report was accepted and adopted.

John G. Barker, Chairman of the Committee on Gardens, reported the awards made by that Committee. It was voted that the report be laid on the table.

E. W. Wood, Chairman of the Committee on Fruits, read the Annual Report of that Committee.

Arthur H. Fewkes, Chairman of the Committee on Flowers, read the Annual Report of that Committee.

Charles N. Brackett, Chairman of the Committee on Vegetables, read the Annual Report of that Committee.

These three reports were severally accepted and referred to the Committee on Publication.

Joseph H. Woodford, Chairman of the Committee of Arrangements, made a verbal report from that Committee, and stated that he would shortly put it in writing. It was voted that the report be accepted, and referred to the Committee on Publication.

James Dole, of Jamaica Plain, and
George Mixter, of Boston,

having been recommended by the Executive Committee as members of the Society, were, on ballot, duly elected.

William Nicholson, of Framingham, was proposed by Joseph H. Woodford, as a member of the Society.

Adjourned to Saturday, December 15.

BUSINESS MEETING.

SATURDAY, December 15, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

William C. Strong, Chairman of the Committee appointed at the meeting on the 3d of November, to consider and report at a future meeting what changes are necessary in the Constitution and By-Laws, presented a report; and J. D. W. French presented a minority report. These reports were accepted, and it was voted that they be laid on the table until the Stated Meeting on the first Saturday in January, 1895, and that they be printed.

William H. Spooner stated that he did not deem it necessary, as a member of the Committee, to make any changes in the Constitution and By-Laws; but that if it was deemed necessary by a majority of the Society, he approved the majority report.

On motion of Francis H. Appleton it was voted that when this meeting is adjourned, it be to eleven o'clock, on Saturday, December 22, and that the Committee on the Building have power to notify the Society of the meeting, if they should deem it advisable.

Benjamin G. Smith moved that a committee of two be appointed to nominate delegates to the Twenty-fourth Session of the American Pomological Society, to be holden at Sacramento, California, January 16, 17, and 18, 1895; to report at this meeting, and that the committee be allowed to add members to the delegation. The motion was carried, and the Chair appointed as that Committee Mr. Smith and William C. Strong. The Committee afterwards reported the names of the following members:

President Nathaniel T. Kidder, *Chairman.*

William C. Strong,	Elijah H. Luke,
C. H. B. Breck,	Edward Kendall,
Francis H. Appleton,	David B. Flint,
Benjamin G. Smith,	J. W. Manning,
John G. Barker,	Chauncy Smith,
Robert Manning,	Leverett M. Chase,
Varnum Frost,	William Falconer,
William C. Barry,	Benjamin K. Bliss,

Frank W. Andrews.

E. W. Wood, Chairman of the Committee on Establishing Prizes, presented the Schedule agreed upon by that Committee, which, after considerable discussion was accepted and adopted for the year 1895.

William E. Endicott, Chairman of the Committee on the Library, read the Annual Report of that Committee, which was referred to the Committee on Publication.

Robert Manning read his Annual Report as Secretary and Librarian, which was accepted and referred to the Committee on Publication.

Adjourned to Saturday, December 22, at eleven o'clock, A. M.

BUSINESS MEETING.

SATURDAY, December 22, 1894.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The President, as Chairman on the Committee on the Building, stated that that Committee had hoped to make a report at this meeting, but were unable to do so, and asked further time, which was granted.

The Secretary at the request of the Chairman of the Committee on Publication and Discussion, presented a Programme of Lectures by William Hamilton Gibson, and moved that the Executive Committee be requested to take into consideration the expediency of providing for the delivery before the Society, and others, of a course of three lectures; with full powers. The motion was carried.

Henry L. Clapp, from the Committee on School Gardens and Children's Herbariums, read the Annual Report of that Committee including the third Annual Report of the Garden at the George Putnam School. The report was accepted, and referred to the Committee on Publication and Discussion.

The meeting was then dissolved.

REPORT

OF THE

COMMITTEE ON PLANTS,

FOR THE YEAR 1894.

By DAVID ALLAN, Chairman.

January 20, Mrs. Frederick L. Ames exhibited some handsome hybrid Masdevallias, of which three received First Class Certificates of Merit, namely: Mary Ames, a crimson, tipped red; Rebecca, a crimson velvet, and Henrietta, purple and yellow. The same exhibitor sent a large plant of the White *Lælia anceps*, which was very much admired.

February 2, Nathaniel T. Kidder, exhibited an exceptionally finely flowered plant of *Acacia heterophylla*.

March 3, Dr. C. G. Weld, staged large specimen plants of Cyclamen, which were well flowered.

SPRING EXHIBITION.

March 28, 29, and 30.

E. W. Gilmore, John L. Gardner, Nathaniel T. Kidder and Edward Butler, made creditable displays of Orchids. In George M. Anderson's exhibit of cyclamens, the flowers were superior to anything ever seen exhibited in our halls. The Lace Plants (*Ouvirandra fenestralis*) were well grown, the best being that shown by John L. Gardner. Rea Brothers made a notable exhibit of Hardy Herbaceous Plants.

May 26, Nathaniel T. Kidder made an excellent display of Calceolarias; Rea Brothers brought a new hardy herbaceous plant, *Astilbe Chinensis*; and F. Sanders & Co., St. Albans, England, a beautiful new bedding plant, *Strobilanthes Dyerianus*, — a foliage plant of elegant colors and marking.

July 21, Alfred H. Wingett, sent a very fine seedling Anthurium—a flowering variety, distinct, for which a Silver Medal was awarded.

July 28, Nathaniel T. Kidder was awarded a Silver Medal, for a noble, excellently grown, and well flowered plant of *Ixora Dixiana*.

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

September 5 and 6.

Nathaniel T. Kidder, Dr. C. G. Weld, and John L. Gardner showed some exceedingly well grown stove and greenhouse plants. William W. Lunt exhibited the rare *Cypripedium Charlesworthii*.

The week following, Oakes Ames, Jr., sent in another of the same species, and John L. Gardner sent a still darker and finer variety than either of the preceding ones.

CHRYSANTHEMUM EXHIBITION.

November 6, 7, 8, and 9.

There is not the least doubt that the plants of Chrysanthemums at this exhibition, were far ahead of any ever exhibited here or anywhere else. Walter Hunnewell (T. D. Hatfield, grower) received first honor, which was richly deserved, although his competitors had excellent plants, and the hall was filled with a mass of grand specimen plants.

November 17, Mrs. Frederick L. Ames exhibited *Cypripedium insigne Sanderæ*. There is no doubt that this is the most noble, prolific, and beautiful orchid ever introduced into this country by the late Frederick L. Ames. It is a yellow ivory variety, and even in a large greenhouse filled with choice orchids, it attracts attention at once. Its prolific growth will bring it within the reach of all exotic plant lovers in a few years. It received the award of the Society's Gold Medal.

December 8, George McWilliam staged a few finely flowered plants of *Luculia gratissima* — sweet scented but difficult to grow. At the same time he exhibited several hybrid Cypripediums, one of which, *Cypripedium Isabellæ*,— the result of a cross between the white *C. niveum*, and *C. Spicerianum* — was much admired, and received the award of a Silver Medal.

PRIZES AND GRATUITIES AWARDED FOR PLANTS.

January 13.

Chinese Primroses.—Six plants in six-inch pots, John L. Gardner	$5 00
Second, Nathaniel T. Kidder	4 00
Third, John L. Gardner	3 00
Lachenalias.—Three six-inch pots of *Lachenalia pendula*, John L. Gardner	5 00
Gratuity:—	
John L. Gardner, Orchids	4 00

January 20.

Gratuities:—	
Mrs. Frederick L. Ames, Orchid	15 00
Jackson Dawson, *Dendrobium nobile*	5 00

February 3.

Freesias.—Six pots, Francis Brown Hayes	5 00
Gratuities:—	
Nathaniel T. Kidder, *Acacia heterophylla* and well grown Cyclamens	6 00
John L. Gardner, *Cattleya Trianæ*	2 00
Mrs. Frederick L. Ames, *Liparis cylindrostachya*	2 00

February 24.

Gratuity:—	
Dr. C. G. Weld, Orchids and Cinerarias	6 00

March 3.

Gratuity:—	
Dr. C. G. Weld, ten Cyclamens	5 00

March 10.

Gratuity:—	
William W. Lunt, *Dendrobium nobile nobilius*	1 00

March 17.

Gratuity:—	
Charles J. Dawson, Genistas, Lilacs, Andromedas, Azaleas, and Kalmias	3 00

SPRING EXHIBITION.

March 28, 29, and 30.

Theodore Lyman Fund.

Indian Azaleas.—Six distinct named varieties, in pots, Dr. C. G. Weld	$20 00
Second, Nathaniel T. Kidder	15 00
Orchids.—Ten plants, in bloom, E. W. Gilmore	30 00
Second, John L. Gardner	25 00

Society's Prizes.

Indian Azaleas.—Four distinct named varieties, in not exceeding ten-inch pots, Bussey Institution	12 00
Two distinct named varieties, the Second prize to Dr. C. G. Weld	4 00
Specimen plant, named, Dr. C. G. Weld	8 00
Second, Dr. C. G. Weld	6 00
Single plant, of any named variety, in not exceeding an eight-inch pot, W. S. Ewell & Son	5 00
Second, Dr. C. G. Weld	4 00
Orchids.—Three plants, in bloom, Nathaniel T. Kidder	10 00
Second, Edward Butler	8 00
Single plant, in bloom, Edward Butler	5 00
Second, John L. Gardner	4 00
Stove or Greenhouse Plant.—Specimen, in bloom, other than Azalea or Orchid, named, Dr. C. G. Weld, *Acacia Drummondii*	8 00
Second, Dr. C. G. Weld	6 00
Hard-Wooded Greenhouse Plants.—Four, in bloom, John L. Gardner	8 00
Second, Nathaniel T. Kidder	6 00
Hardy Flowering Deciduous Shrubs, other than Azaleas, Forced.—Four, of four distinct species, named, Bussey Institution	8 00
Second, John L. Gardner	6 00
Hardy Flowering Evergreen Shrubs, Forced.—Four, of four distinct species, named, Bussey Institution	8 00
Cyclamens.—Ten plants, in bloom, George M. Anderson	8 00
Second, Dr. C. G. Weld	6 00
Three plants, in bloom, George M. Anderson	4 00
Second, George M. Anderson	3 00
Single plant, in bloom, Nathaniel T. Kidder	3 00
Second, George M. Anderson	2 00
Third, George M. Anderson	1 00
Hardy Primroses.—Ten plants, of distinct varieties, in bloom, John L. Gardner	5 00
Second, Bussey Institution	4 00

Polyanthuses.—Ten plants, Fancy and Gold Laced, the Second prize to Bussey Institution	$4 00
Auriculas.—Six, in pots, Dr. C. G. Weld	3 00
Cinerarias.—Six varieties, in bloom, in not exceeding nine-inch pots, John L. Gardner	8 00
Second, Dr. C. G. Weld	6 00
Third, Elisha S. Converse	5 00
Three varieties, in bloom, in not exceeding nine-inch pots, John L. Gardner	5 00
Second, Dr. C. G. Weld	4 00
Single plant, in bloom, Dr. C. G. Weld	3 00
Second, John L. Gardner	2 00
Ouvirandra fenestralis.—John L. Gardner	12 00
Second, Elisha S. Converse	8 00

Special Prize for Florists only.

General Display of Spring Bulbs.—All classes, Bussey Institution	12 00
The Third prize to William S. Ewell & Son	8 00

Regular Prizes.

Hyacinths.—Twelve distinct named varieties, in pots, one in each pot, in bloom, Nathaniel T. Kidder	10 00
Second, Dr. C. G. Weld	8 00
Third, John L. Gardner	6 00
Six distinct named varieties, in pots, one in each pot, in bloom, Nathaniel T. Kidder	6 00
Second, John L. Gardner	5 00
Third, Bussey Institution	4 00
Three distinct named varieties, in pots, one in each pot, in bloom, Nathaniel T. Kidder	4 00
Second, Bussey Institution	3 00
Third, John L. Gardner	2 00
Single named bulb, in pot, in bloom, John L. Gardner	2 00
Second, Bussey Institution	1 00
Three pans, not to exceed twelve inches, ten bulbs of one variety in each pan, in bloom, Nathaniel T. Kidder	10 00
Second, John L. Gardner	8 00
Third, Bussey Institution	6 00
Two pans, not to exceed twelve inches, ten bulbs of one variety in each pan, in bloom, Dr. C. G. Weld	8 00
Second, Dr. C. G. Weld	6 00
Third, Nathaniel T. Kidder	5 00
Single pan, not to exceed twelve inches, with ten bulbs of one variety, Elisha S. Converse	5 00
Second, Nathaniel T. Kidder	4 00
Third, Dr. C. G. Weld	3 00

Tulips.—Six eight-inch pans, nine bulbs of one variety in each, in bloom, William S. Ewell & Son	$5 00
Second, Bussey Institution	4 00
Third, Nathaniel T. Kidder	3 00
Three eight-inch pans, nine bulbs of one variety in each, in bloom, William S. Ewell & Son	4 00
Second, Bussey Institution	3 00
Third, Elisha S. Converse	2 00
Three ten-inch pans, twelve bulbs of one variety in each pan, in bloom, Bussey Institution	6 00
Second, William S. Ewell & Son	5 00
Third, John L. Gardner	4 00
Polyanthus Narcissus.—Four seven-inch pots, three bulbs in each, distinct varieties, in bloom, John L. Gardner	6 00
Second, Bussey Institution	4 00
Jonquils.—Six six-inch pots, the number of bulbs in each to be at the discretion of the grower, in bloom, John L. Gardner	5 00
Second, Bussey Institution	3 00
Third, Dr. C. G. Weld	2 00
Lilium longiflorum.—Three pots, not exceeding ten inches, Dr. C. G. Weld	8 00
Second, William S. Ewell & Son	6 00
Lilium Harrisii.—Three pots, not exceeding ten inches, Dr. C. G. Weld	8 00
Second, Elisha S. Converse	6 00
Lily of the Valley.—Six six-inch pots, in bloom, Bussey Institution	5 00
Second, William S. Ewell & Son	4 00
Anemones.—Three pots or pans, Bussey Institution	5 00
Freesias.—Six pots or pans, Dr. C. G. Weld	5 00
Second, John L. Gardner	4 00
Ixias.—Six pots, in varieties, Dr. C. G. Weld	4 00
Tritonia crocata.—Six pots, John L. Gardner	4 00
Roman Hyacinths.—Six eight-inch pans, ten bulbs in a pan, Dr. C. G. Weld	5 00
Second, John L. Gardner	4 00
Third, William S. Ewell & Son	3 00

Gratuities:—

Francis Brown Hayes, White Rhododendrons	2 00
Mrs. Oswald Fiedler, Palm	1 00
Edward Butler, for skilful cultivation of *Dendrobium nobile*	10 00
Bussey Institution, Collection	15 00
Rea Brothers, "	10 00
Norton Brothers, "	10 00
George M. Anderson, Display	3 00

April 7.

Gratuity:—

Edward Butler, *Dendrobium nobile* $5 00

April 14.

Gratuity:—

James Comley, *Lilium longiflorum* 6 00

April 21.

Gratuities:—

John L. Gardner, Orchids 5 00

Francis Brown Hayes, *Rhododendron Veitchianum lævigatum* . . 2 00

MAY EXHIBITION.

May 5.

Calceolarias.—Six varieties in pots, John L. Gardner . . . 8 00

Second, Elisha S. Converse 6 00

Third, William F. Gregory 4 00

Single plant, Elisha S. Converse 3 00

Second, John L. Gardner 2 00

Third, Elisha S. Converse 1 00

Gratuities:—

John L. Gardner, Orchids and Ericas 6 00

Norton Brothers, *Dendrobium thyrsiflorum* 2 00

" " two Hydrangeas 5 00

Charles J. Dawson, Ixias 4 00

May 12.

Gratuity:—

W. P. Winsor, two Dendrobiums 3 00

May 19.

Gratuity:—

John L. Gardner, Orchids 10 00

May 26.

Gratuity:—

Nathaniel T. Kidder, Display of Calceolarias 5 00

RHODODENDRON SHOW.

June 6 and 7.

Gratuity:—

Walter Hunnewell, Plants of Digitalis 5 00

ROSE EXHIBITION.

JUNE 20 AND 21.

STOVE AND GREENHOUSE FLOWERING PLANTS.—Two distinct named varieties, in bloom, no Orchid admissible, Dr. C. G. Weld . $15 00

SPECIMEN PLANT IN BLOOM.—Named, other than Orchid, Dr. C. G. Weld 7 00

HARD-WOODED GREENHOUSE PLANTS.—Three, of three distinct named varieties, in bloom, John L. Gardner 8 00

Second, Dr. C. G. Weld 6 00

ORCHIDS.—Six plants, of six named varieties, in bloom, Elisha W. Gilmore 25 00

Second, John L. Gardner 15 00

Three plants, of three named varieties, in bloom, Edward Butler 15 00

Second, John L. Gardner 10 00

Single specimen, named, in bloom, John L. Gardner . . . 8 00

Second, Edward Butler 6 00

JUNE 30.

Gratuity:—

John L. Gardner, *Nertera depressa* 1 00

JULY 7.

Gratuity:—

John L. Gardner, Orchids 3 00

JULY 14.

Gratuity:—

John L. Gardner, Orchids 3 00

AUGUST 18.

Gratuity:—

Benjamin Grey, six plants of *Cattleya Gaskelliana* var. . . . 3 00

AUGUST 25.

Gratuity:—

Benjamin Grey, Cattleyas 3 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

SEPTEMBER 5 AND 6.

Special Prizes offered by the Society.

PALMS.—Pair, in pots or tubs not more than twenty-four inches in diameter, Dr. C. G. Weld 12 00

Pair, in pots not more than fourteen inches in diameter, Nathaniel T. Kidder 8 00

Regular Prizes.

Greenhouse Plants.—Six greenhouse and stove plants, of different named varieties, two Crotons admissible, Nathaniel T. Kidder	$30 00
Second, John L. Gardner	25 00
Third, Dr. C. G. Weld	20 00
Single plant for table decoration, dressed at the base with living plants only, only one entry admissible, the second prize to Nathaniel T. Kidder	6 00
Third, Elisha S. Converse	4 00
Ornamental Leaved Plants.—Six named varieties, not offered in the collection of greenhouse plants, Crotons and Dracænas not admissible, Nathaniel T. Kidder	20 00
Second, Nathaniel T. Kidder	15 00
Single specimen, variegated, named, not offered in any collection, Nathaniel T. Kidder	6 00
Second, Dr. C. G. Weld	5 00
Third, Dr. C. G. Weld	4 00
Caladiums.—Six named varieties, Nathaniel T. Kidder	6 00
Second, Dr. C. G. Weld	4 00
Ferns.—Six named varieties, no Adiantums admissible, Nathaniel T. Kidder	10 00
Second, Dr. C. G. Weld	8 00
Adiantums.—Five distinct named species, Dr. C. G. Weld	8 00
Second, Nathaniel T. Kidder	5 00
Lycopods.—Four named varieties, Nathaniel T. Kidder	5 00
Second, Dr. C. G. Weld	4 00
Dracænas.—Six named varieties, Dr. C. G. Weld	8 00
Second, Nathaniel T. Kidder	6 00
Crotons.—Six, in six-inch pots, Dr. C. G. Weld	6 00
Second, Dr. C. G. Weld	5 00
Third, John L. Gardner	4 00
Nepenthes.—Three plants, named, John L. Gardner	6 00
Orchids.—Six plants, named varieties, in bloom, John L. Gardner	10 00
Three plants, named varieties, in bloom, Benjamin Grey	8 00
Single plant, in bloom, John L. Gardner	5 00
Tuberous Begonias.—Six pots, of six varieties, Charles Weld	10 00
Second, Elisha S. Converse	8 00
Third, Charles E. Weld	6 00
Fourth, Bussey Institution	4 00

Gratuities:—

Botanic Garden of Harvard University, Collection of Sarracenias	15 00
David Allan, Collection of seventy-five plants	15 00
John W. Ellis, Fern and Panax	10 00

October 3.

Gratuity:—

Nathaniel T. Kidder, *Allamanda Williamsii*	5 00

OCTOBER 6.

Gratuity:—

John L. Gardner, Seedling Chrysanthemum $2 00

OCTOBER 13.

Gratuity:—

William W. Lunt, *Oncidium Gravesianum* 2 00

OCTOBER 20.

Gratuity:—

John L. Gardner, three Orchids and a small Chrysanthemum . . 3 00

OCTOBER 27.

John L. Gardner, *Vanda Sanderiana* 5 00

CHRYSANTHEMUM SHOW.

NOVEMBER 6, 7, 8, AND 9.

CHRYSANTHEMUMS.— Display of twelve named plants, any or all classes, distinct varieties, Walter Hunnewell 60 00
Second, Nathaniel T. Kidder 50 00
Third, Nathaniel T. Kidder 40 00
Fourth, John L. Gardner 30 00
Twelve plants, of twelve different varieties, grown to one stem and bloom, in not exceeding six-inch pots, preference given to plants not over three feet in height, Thomas Doliber . . 12 00
Second, Dr. C. G. Weld 10 00
Third, John L. Gardner 8 00
Fourth, William F. Gregory 6 00
Six plants grown as above, but all of one color, White, Dr. C. G. Weld 6 00
Second, Thomas Doliber 5 00
Pink, " " 6 00
Yellow, " " 6 00
Any other color, Dr. C. G. Weld 6 00
Group of plants, arranged for effect, limited to one hundred and fifty square feet, preference being given to collections with palms or other foliage added, Bussey Institution . . . 45 00
Second, John L. Gardner 40 00
Third, William H. Elliott 35 00
Six Japanese, distinct named varieties, Dr. C. G. Weld . . 20 00
Second, Walter Hunnewell 15 00
Third, Mrs. John S. Farlow 10 00
Specimen Incurved or Chinese, named variety, Walter Hunnewell 6 00
Second, Mrs. John S. Farlow 5 00
Specimen Japanese, named variety, Nathaniel T. Kidder . . 6 00
Second, Walter Hunnewell 5 00
Third, Mrs. John S. Farlow 4 00

Gratuities:—

John L. Gardner,	Display of Chrysanthemum plants . . .	$35 00
William H. Elliott,	" " " " . . .	25 00
Bussey Institution,	" " " " . . .	5 00
William H. Elliott,	twelve chrysanthemum plants	5 00
Joseph Comley,	Chrysanthemum James Comley	3 00
James Comley,	Dwarf Sago Palm	4 00

NOVEMBER 17.

Gratuity:—

Francis Brown Hayes, new Chrysanthemum James Comley . . 3 00

DECEMBER 8.

Gratuity:—

George McWilliam, plants in bloom of *Luculia gratissima* . . 2 00

DECEMBER 22.

Gratuity:—

Mrs. Frederick L. Ames, *Lælia autumnalis* 10 00

SOCIETY'S GOLD MEDAL.

November 17. Mrs. Frederick L. Ames, *Cypripedium insigne Sanderæ*, first time the variety was ever exhibited in this country.

SOCIETY'S SILVER MEDAL.

January 20. William Robinson, successful raising of a new seedling Masdevallia.

June 9. Joseph Tailby & Son, new Calla, *Richardia Elliotiana.*

July 21. Alfred H. Wingett, Seedling Authurium.

July 28. Nathaniel T. Kidder. *Ixora Dixiana.*

Annual Exhibition, September 5 and 6. William W. Lunt, *Cypripedium Charlesworthii.*

October 6. John L. Gardner, *Cypripedium Charlesworthii.*

" " David Allan, *Bougainvillea Sanderiana.*

December 8. George McWilliam, *Cypripedium Isabellæ*, a cross between *C. Spicerianum* and *C. niveum.*

FIRST CLASS CERTIFICATES OF MERIT.

January 20. Mrs. Frederick L. Ames, New seedling hybrid Masdevallia, Mary Ames.

" " Mrs. Frederick L. Ames, New seedling hybrid Masdevallia, Rebecca.

" " Mrs. Frederick L. Ames, New seedling hybrid Masdevallia, Henrietta.

" " Charles Storer, Pawtucket, R. I., New seedling Cypripedium.

April 7. Walter Hunnewell, Hardy Primrose, Mrs. E. M. Gill.
May 26. F. Sander & Co., St. Albans, Herts, England, *Strobilanthes Dyerianus*, a new bedding plant.
" " Rea Brothers, *Astilbe Chinensis*, a hardy herbaceous plant.
" " Francis Brown Hayes, *Hydrangea Benigaker* (new).
Annual Exhibition, September 5 and 6. William A. Manda, South Orange, N. J., *Adiantum Capillus-Veneris imbricata*.
September 15. Oakes Ames, Jr., *Cypripedium Charlesworthii*.
Exhibition of Winter Fruits and Vegetables, November 17. Mrs. Frederick L. Ames, two seedling Cypripediums.

COMPLIMENTARY NOTICES.

Chrysanthemum Show, November 6–9. Walter Hunnewell, Chrysanthemum John Shrimpton.

REPORT

OF THE

COMMITTEE ON FLOWERS,

FOR THE YEAR 1894.

By ARTHUR H. FEWKES, Chairman.

The exhibitions of flowers during the past year have been excellent, considering the exceedingly dry summer; and the competition has been good, there being comparatively few prizes that were not awarded — so few in fact that we have been obliged to withhold gratuities from many worthy exhibits, owing to a lack of funds, as it has always been the custom to depend almost entirely upon the unawarded prize money for this purpose, and we have usually been able to make ample awards to all such without exceeding our appropriation.

There have been but few extraordinary displays, but we think the general average quality has been far above that of previous years.

There has not been a Saturday during the year when there has not been at least one or more exhibits worthy to claim our attention. In many classes we have noticed considerable increase of interest, and in some the displays have far excelled those of previous years.

In Native Flowers there have been several new exhibitors, and many instructive displays.

Aquatics have continued to claim a large share of interest, and the Dahlia has been more extensively shown than for many years.

There were some quite remarkable displays early in the season; notably one of cut Orchids, January 20, from Mrs. Frederick L.

Ames, to whom a First Class Certificate of Merit was awarded for each of the following named specimens: Hybrid *Selenipedium Helene*, Hybrid *Lælia Digbyana Mossiæ*, and *Lælia anceps* var. *Schroderæ*.

The first prize day was February 3, and some very creditable exhibits were made, especially of Orchids.

From this date until the Spring Show the displays were numerous and interesting.

SPRING EXHIBITION.

March 28, 29, and 30.

As at the corresponding show of last year, the flowers made but a small part of the exhibition, and the competition in the cut Roses was very meagre. There were no competitors for the Hybrid Rose prizes, and but two for the Teas. As usual the Violets and Pansies made a very good showing, and the Carnations in specified colors were very attractive. Among these the best crimson variety shown in competition was Ferdinand Mangold; best Pink, Nicholson; best Scarlet, Hector; best White, Lizzie McGowan; and the best Yellow, Henrietta Sargent.

Among the miscellaneous displays there were some quite noticeable; particularly the Wistarias, Andromedas, Antirrhinums, and Sweet Peas.

April 14, Warren H. Manning exhibited *Cornus stolonifera aurea*, a new variety of the Red Osier Dogwood, found wild by him and brought under cultivation. It is a valuable addition to the hardy shrubs, as the bright yellow color of the bark will make it very useful in shrubbery planting for winter effect. A First Class Certificate of Merit was awarded Mr. Manning for it.

Wild flowers were shown for the first time this season, April 21, by Mrs. P. D. Richards.

MAY EXHIBITION.

May 5.

The prizes were nearly all competed for at this show, and many good things were exhibited in those collections not in competition. The collections of Hardy Narcissuses were more numerous than

usual. Native Plants were shown by an uncommonly large number of exhibitors, and their collections included many rare species.

Jackson Dawson brought in from the Arnold Arboretum two new shrubs, each of which was awarded a First Class Certificate of Merit. One was a new species of Spiræa from Japan, *S. angusta*, in the way of *S. Thunbergii* but with a more dense habit. It is a very distinct and valuable addition to the hardy shrubs. The other was *Prunus spinosus fl. pl.*, a semi-double variety of the Black Thorn, and a beautiful addition to the hardy shrubs.

On the next four Saturdays there were numerous exhibits, but nothing outside of the usual lines.

RHODODENDRON SHOW.

June 6 and 7.

Although this was a beautiful exhibition it did not equal that of 1893. The prizes for Rhododendrons and Azaleas were quite generally competed for, but there were no entries in the classes for Pæonies or Clematis. The former were absent on account of the show being a little too early for them, and therefore the prizes were postponed until Saturday of the following week.

The principal exhibitors of Rhododendrons were Francis Brown Hayes, H. H. Hunnewell, John L. Gardner, and Samuel J. Trepess.

Beside the regular prizes, Francis Brown Hayes and H. H. Hunnewell made grand displays of Rhododendrons and Azaleas not in competition; and Hon. Joseph S. Fay made a large and interesting display of Flowering Trees and Shrubs, arranged for effect, in which the Hawthorns were as usual a very noticeable feature.

One exhibit of great interest to botanists and to lovers of plants in their natural forms was made by Jackson Dawson, who brought in from the Arnold Arboretum a collection of forty species and varieties of roses. They were the natural, wild forms, from different parts of the world, and possessed a peculiar grace and beauty.

George Chase exhibited a rare shrub, which is sufficiently beautiful to be included in every collection of shrubs, *Viburnum*

tomentosum, of which a variety grown under the name of *Viburnum plicatum* (Japan Snowball) is much better known.

Other noticeable displays were the collections of Herbaceous Plants, the Hardy Pyrethrums, German Irises, Seedling Clematis, and the numerous collections of Wild Flowers.

A Complimentary Notice was issued to Mrs. Mary T. Goddard for a new seedling Clematis.

June 9, L. T. Seaver exhibited his strain of Ruffled Pansies; while there were many beautiful flowers in the collection, it was our opinion that the ruffling was a doubtful improvement to the Pansy.

June 16 was the day to which the prizes for Herbaceous Pæonies were postponed from the Rhododendron Show; and it is evidently the proper date on which to exhibit this flower for prizes as the display of them at this time was remarkable, excelling any previous effort, there being ten different exhibitors. Such exhibitions as this will do much to revive the interest in this grand old flower.

Another noticeable display on this day was made by Jackson Dawson, who showed twenty-nine varieties of Hybrid Polyantha Roses, for which he was awarded the Society's Silver Medal. They were all hybrids of *Rosa multiflora*, fertilized with pollen from various other species.

ROSE EXHIBITION.

June 20 and 21.

Considering the dryness of the season, this was an excellent exhibition, and the competition for the prizes was quite general. There were some new competitors, but, as in previous years, by far the largest contributor was Hon. Joseph S. Fay.

Among the new Roses shown by Mr. Fay, those which seemed most promising were Mrs. Harkness and Charles Gater. The former is a large, full rose, in the way of Merveille de Lyon, but of a deep, rich, rose color; the latter is a very bright scarlet-crimson. There were a good number of miscellaneous displays, and particularly noticeable among them were the Improved Candytuft, from D. Zirngiebel, and *Ostrowskya magnifica*, from the Bussey Institution. They were each awarded a First Class Cer-

tificate of Merit. The Candytuft is a magnificent thing in its way, with numerous spikes of very large, pure white, individual flowers. The *Ostrowskya* is a handsome Bell-flower, in the way of Platycodon, but larger and a very rare and difficult plant to cultivate.

We are pleased to state that this was the last Rose Show at which the roses will be allowed to be shown in boxes; in future the glass vases will be used, the same as for other exhibits.

June 30, additional prizes were offered for Hardy Roses, this being the first season that they have been offered at this date, and the result was a very fine display, fully equal in quality to those shown at the regular Rose Exhibition, or even better.

The remaining weekly exhibitions, until the Annual in September, were kept up to their usual excellence, but we noted nothing that required special mention, except a seedling *Nymphæa odorata*, shown by Dr. R. H. Faunce, August 4, for which a Complimentary Notice was issued.

August 25, Asters were shown in great numbers and of very fine quality for so dry a season.

ANNUAL EXHIBITION.

September 5 and 6.

This show is always looked forward to as one of the most interesting of the year, and the present one fully sustained that reputation. The displays of Dahlias were more extensive than have been seen here for many years. It seemed like the beginning of a revival of interest in this, at one time, extremely popular flower.

The displays of Flowering Cannas added much to the brilliancy of the exhibition. They were well represented by David Fisher, Walter H. Cowing, and R. & J. Farquhar & Co. The last brought a collection of mostly new varieties, the best of which were Admiral Avellan, Souvenir d'Antoine Crozy, Mme. Montefiore, and J. Farquhar. By far the finest Canna ever shown here — Mrs. Fairman Rogers — is a seedling, raised by James S. Cowles, of Newport, R. I. It was first exhibited here two years ago, and it was awarded the Society's Silver Medal. Mr. Cowles brought flowers of it to this exhibition also, which proved that it still retains its superior qualities.

The ever interesting displays of aquatic plants were an important feature and attracted the usual number of admirers. Although the *Victoria regia* was not exhibited, the beautiful Nymphæas and Nelumbiums, in the collections of Hon. John Simpkins, Dr. Daniel D. Lee, L. W. Goodell, William W. Lee, and P. Bisset, made up in a great measure for its absence. Owing to the great interest manifested in these plants we have thought it would be interesting if we could present with this report, statements of the method of cultivation. We have been favored with such statements from James Brydon, gardener to Hon. John Simpkins, Yarmouthport, and Dr. Daniel D. Lee, Jamaica Plain, which are appended to this report. The former treats more of the cultivation of the tender kinds, while the latter confines himself mostly to the hardy ones, such as all may grow with little trouble. As these papers come from expert growers, they will be found both interesting and valuable.

First Class Certificates of Merit were awarded to Hon. John Simpkins for *Nymphæa delicatissima* and *N. Deaniana;* the Oasis Nursery Co., for Tuberous Begonias; and R. & J. Farquhar & Co., for new Cannas.

A Complimentary Notice was given to P. Bisset, Washington, D. C., for seedling Nymphæas.

October 6, Walter Hunnewell was awarded a First Class Certificate of Merit for the new Chrysanthemum, Mrs. E. G. Hill.

October 20, T. D. Hatfield was awarded a First Class Certificate of Merit for his new seedling Incurved Chrysanthemum, Mrs. T. D. Hatfield.

CHRYSANTHEMUM SHOW.

November 7, 8, 9, and 10.

Each year it seems as though we had attained the highest point of excellence possible in Chrysanthemums, but the next season always brings some surprises, and the present show was not an exception. The flowers exhibited by Hon. John Simpkins and the Waban Rose Conservatories were indeed wonderful. Scarcely less so were the flowers shown by W. Slack, of Stamford, Conn., who exhibited here for the first time.

Nearly every class of prizes was competed for by one or more exhibitors, but the greatest competition was in the classes for twenty-five blooms of twenty-five distinct varieties; and the large vases of blooms on long stems. In the latter class Hon. John Simpkins put up two vases of flowers, the equals of which have never before been shown here.

There were but few entries in the classes for seedlings, the most noticeable being the one shown by Hugh Graham & Son, of Philadelphia, a sulphur white Japanese of incurved form, but with peculiarly arranged petals, and named Philadelphia.

A First Class Certificate of Merit was awarded to Siebrecht & Wadley, New Rochelle, N. Y., for their new Rose, Belle Siebrecht; and one to George B. Gill, for his seedling red Chrysanthemum, Ox Blood.

Complimentary Notices were given to Sewall Fisher, for seedling Carnations, Crystal and No. 162; Calvin S. Goddard, for a Chrysanthemum bearing his name; George Hollis, for Chrysanthemum Golden Rule; J. Eaton, Jr., for Chrysanthemum Penikese; Patrick Melia, for Chrysanthemum October Queen; Henry A. Gane, for Chrysanthemums Mrs. George A. Gane and Mrs. Louise P. Chard; and Kenneth Finlayson, for Chrysanthemum Mrs. E. B. Freeman.

The extremely large blooms are magnificent in their way, and show what can be done with the chrysanthemum in skillful hands. We would not say one word against them, but in striving for immense size are we not losing many interesting forms which always attract much attention when put on exhibition? It is true they are not valuable commercially, but a Chrysanthemum Show is not now complete unless all the forms are represented, and efforts should be made to grow as many forms as possible. Many curious things have come to this country from Japan, which have been lost simply because they were of no use as market flowers, or because they could not compete in the same classes as the monster blooms. This should not be so, and we hope that at no distant time we shall see more of the small but curious forms at our exhibitions.

November 17, a First Class Certificate of Merit was awarded to Norris F. Comley for seedling Chrysanthemum, Francis B. Hayes.

Nathaniel T. Kidder, having obtained the greatest number of

first prizes throughout the season for Herbaceous Plants, became entitled to the Appleton Silver Medal. As no other exhibitor has received more than one first prize the Bronze Medal is withheld.

The Committee have awarded, during the year, one Society's Silver Medal; fifteen First Class Certificates of Merit; and twelve Complimentary Notices.

The amount appropriated for flowers for the year 1894 was	$2,500 00
We have awarded to date, in prizes and gratuities, including medals	2,443 00
Leaving an unexpended balance of . .	$57 00

All of which is respectfully submitted,

For the Committee,

ARTHUR H. FEWKES,

Chairman.

NYMPHÆAS, TENDER AND HARDY.

By James Brydon, Gardener to Hon. John Simpkins, Yarmouthport.

The popularity of both the tender and hardy water lilies, especially the latter, has greatly increased during the last ten years. This is not surprising when one considers their wealth of grace and beauty, and the comparative ease with which they may be grown. Few flowers elicit the admiration of the public like water lilies.

Their cultivation is very simple, few plants responding more readily to the care of the cultivator.

The soil best suited to them is a mixture of two-thirds loam and one-third decomposed manure. This should be stacked up in November, for use in the following spring.

Those not in possession of large lily ponds need not be deterred from attempting their culture, as very good flowers can be obtained by planting in tubs; or in small tanks, built of brick and cement, and sunk level with the surface of the lawn. A tank about six feet square and two and one-half feet deep, will accommodate two or three of the smaller growing species quite well; larger tanks will, of course, admit of more varieties being grown, and therefore give a better display. The soil need not exceed eight inches in depth and can be spread evenly over the bottom. In the case of large ponds I prefer using boxes four feet square and one foot deep. This gives plenty of soil for one season's growth. The Nymphæas best suited for tubs or small tanks are the Marliac varieties—notably *Marliacea chromatella*—and of the tender varieties for this purpose *N. azurea* and *N. cærulea* succeed admirably.

I have found April the best month to overhaul and replant all the hardy varieties. It should be done as early in the month as the weather will permit. Filling in the boxes or tanks with new soil, and resetting a good, healthy piece of the root, or rhizome, completes the operation. Annual transplanting gives finer flowers and greatly lengthens the season of blooming. It should be borne in mind, however, when replanting, that the largest sized roots or crowns are not so satisfactory as medium to small ones; the latter being far more floriferous. After the work of transplanting is

done, cover the surface soil with two inches of clean sand and fill up with water. With the advent of warm weather growth will soon commence, after which little care or attention will be required except keeping the pond full of water.

On the approach of winter, the tanks or ponds, when not too large, should have boards placed across the top and a good covering of leaves placed over all; this will protect the lily roots from frost. Also, what is equally important in cases where ponds have walled sides, and it is not possible to cover the whole surface, a good covering of leaves on the walls is very important to prevent their cracking.

The tender, or tropical, lilies should be potted in five-inch pots and started into growth about April 20, keeping the water at about eighty or eighty-five degrees. Pot on, as required, and by June 15 they should be large plants, ready to place in summer quarters, using the boxes and soil before recommended for the hardy varieties. As a means of keeping up the stock, some of each variety should be allowed to remain all summer in six-inch pots. These will produce several hard, well-ripened bulbs which will be ready for potting the following April. Large plants that have flowered during the summer are incapable of being ripened off, and are better discarded.

We were formerly of the opinion that in order to grow Tropical Nymphæas successfully, artificial heat was absolutely necessary. Experience, however, has shown that they do almost as well without it. In unheated ponds I should advise thinner planting; open spaces of water between the plants add greatly to the beauty of the whole, and allow the water to warm more rapidly by sunheat.

The *Victoria regia*, being an annual, requires a somewhat different treatment. Seeds should be sown about February 20, in any ordinary soil and placed in water kept at a steady temperature of ninety degrees. The seed will ordinarily germinate in thirteen days, and the young plants should be immediately removed from the seed pans, and placed singly in good sized tubs, and encouraged to grow by keeping the water sweet and clean, and the temperature steady as above. The object of transplanting to tubs thus early is to avoid giving any check to the rootgrowth, which I have found very undesirable in growing this plant. In my opinion the rule of potting on, required by nymphæas, does not apply to the *Victoria regia*.

By the middle of June, about which time it is safe to trust it outside, the plant should have several leaves, the largest of which should be over two feet in diameter. It is then ready for its summer quarters. Place it in a bed of good, rich soil about ten feet square and one foot deep, first well warming both soil and water. If it continues to grow well the first flower should appear in about forty days after planting, and continue to produce flowers at intervals of two or three days till fall.

The following is a list of the best tender and hardy Nymphæas.

HARDY.

N. alba candidissima.
N. exquisita.
N. helveola (shallow water).
N. Laydekeri.
N. Marliacea albida.
N. " *carnea.*
N. Marliacea chromatella.
N. " *rosea.*
N. odorata Carolinensis.
N. " *rosea.*
N. " *sulphurea.*
N. pygmæa (shallow water).

TENDER.

N. cærulea.
" *Columbiana.*
" *Deaniana.*
" *delicatissima.*
" *dentata.*
" *Devoniensis.*
N. elegans.
" *gigantea.*
" *rubra.*
" *Zanzibarensis.*
" " *azurea.*
" " *rosea.*

WATER LILIES.

By Dr. Daniel D. Lee.

Boston, November 29, 1894.

Arthur H. Fewkes,

Sir:— Water lilies may be grown in this vicinity without any particular trouble, as follows:

Use a pond — not more than two feet deep — or build a cement basin of any shape; an irregular outline is the most effective.

No stone or brickwork is necessary. Use Rosendale cement mixed, one to four parts, with sand for a foundation. Slope the sides of the pond a good deal, as lilies require area more than depth. Eighteen inches is deep enough.

Over this Rosendale cement spread Portland cement mixed with sand, one to four parts, and finally wash the whole with pure Portland cement, using a broom to spread it. Fill with water and test before putting in loam and manure.

When the pond is tight take cow and horse manure and fill in about six inches deep; on this put two or three inches of loam and cover the whole with sand two inches deep. This last keeps the water clear and prevents the manure from floating on the surface of the water.

The best lilies in a pond where no artificial heat is used, are

Nymphæa alba candidissima. *Nymphæa sulphurea.*
" *Marliacea chromatella.* " *Zanzibarensis azurea*
" *odorata rosea* (pink lily). " " *rosea.*

The following will also do well unless the season is very cold:

Nymphæa dentata,
" *Devoniensis*,
" *rubra*,
} night bloomers, 7 P. M. to 11 A. M.

To prevent snails, put goldfish in the pond, after the first week or two, or when the freshness of the cement is passed.

By having the edge of the pond lower than the earth around it, many semi-aquatic plants may be grown in the resulting mud. The most striking of the hardy ones are:

Arundo donax.
" " *var.*
Eulalia Japonica.
Zizania aquatica (wild rice, will also grow in water).

But a catalogue of aquatic and semi-aquatic plants will furnish all the information necessary in selecting plants.

All ponds ferment and are very disappointing in the early summer, but during August and September they are fine.

In many ponds the plants stop blooming from lack of room; they become crowded towards the end of August. Watch them and throw out some of the surplus plants before this happens.

But these are only a few of the possibilities of a lily pond. If a natural pond is used the bottom should be prepared as described, or boxes be used to hold the lily roots.

The various Nelumbium (lotus) varieties may also be grown in the same way as lilies.

PRIZES AND GRATUITIES AWARDED FOR FLOWERS, 1894.

January 6.

Gratuities : —

David Allan, Cut Cypripediums	$2 00
Mrs. A. D. Wood, Cut Flowers	2 00

January 13.

Gratuities : —

W. N. Craig, Vase of Violets	1 00
Richard T. Lombard, Two vases of Carnations	1 00
Walter E. Coburn, Collection of Primroses	1 00
William W. Edgar, Vase of Mignonette	3 00
Francis Brown Hayes, Display of Flowers	5 00
Mrs. A. D. Wood, Basket of Flowers	3 00
Mrs. E. M. Gill, Cut Flowers	1 00

January 20.

Gratuities : —

Mrs. Frederick L. Ames, Cut Orchids	3 00
Lucius H. Foster, Vase of Carnation Daybreak	1 00
Dr. C. G. Weld, Amaryllis, etc.	1 00
Mrs. E. M. Gill, Vase of Flowers	1 00
Mrs. A. D. Wood, Basket of Flowers	1 00

January 27.

Gratuities : —

Richard T. Lombard, Display of Carnations	5 00
Francis Brown Hayes, Cut Flowers	2 00
Mrs. E. M. Gill, Basket of Flowers	1 00

February 3.

Orchids.— Display of named species and varieties, filling not less than twenty bottles, Mrs. Frederick L. Ames	15 00
Second, John L. Gardner	10 00
Violets.— Best collection of varieties, fifty blooms in each bunch, Nathaniel T. Kidder	4 00
Carnations.— Display of cut blooms, with foliage, not less than six varieties, in vases, William Nicholson	5 00
Second, Richard T. Lombard	4 00

Camellias.— Display of named varieties, cut flowers with foliage, not less than twelve blooms, of not less than six varieties.
John L. Gardner $4 00
Second, Francis Brown Hayes 3 00

Gratuities : —

H. K. Southworth, Carnations, Pansies, and Violets . . . 3 00
Francis Brown Hayes, Camellias and Carnations 3 00
Lucius H. Foster, Carnations 2 00
Edwin Lonsdale, Vase of Carnation Helen Keller 1 00
Walter E. Coburn, Chinese Primulas 1 00
Richard T. Lombard, Daffodils, etc. 1 00
Mrs. A. D. Wood, Cut Flowers 3 00
Mrs. E. M. Gill, " " 2 00

February 17.

Gratuities : —

Francis Brown Hayes, Camellias, etc. 3 00
Bussey Institution, Forced Azaleas and Hellebores 2 00
Charles E. Richardson, *Acacia longifolia* 1 00

February 24.

Gratuities : —

George McWilliam, Collection of Orchids 4 00
Bussey Institution, Lilacs and Anemones 2 00
Francis Brown Hayes, Camellias, Roses, etc. 2 00
Mrs. E. M. Gill, Cut Flowers 1 00

March 3.

Gratuities : —

Francis Brown Hayes, Display of Cut Flowers 4 00
Mrs. A. D. Wood, Vase of Flowers and Cut Flowers . . . 2 00
Mrs. E. M. Gill, " " " 1 00

March 10.

Gratuities : —

Francis Brown Hayes, Display of Roses and Wistaria . . . 4 00
Arthur H. Fewkes, *Antirrhinum majus* 1 00
R. & J. Farquhar & Co., *Heuchera sanguinea* 1 00
Bussey Institution, Forced Herbaceous Plants and Shrubs . . 3 00
Mrs. A. D. Wood, Cut Flowers 3 00
Mrs. E. M. Gill, Basket of Flowers 1 00

March 17.

Gratuities : —

Daniel Duffley, Display of Violets 1 00
Mrs. A. D. Wood, Cut Flowers 2 00
Mrs. P. D. Richards, Display of Buds, Blossoms, and Berries of Wild Plants 1 00

SPRING EXHIBITION.

March 28, 29, and 30.

Tender Roses in Vases.— Twelve blooms of Catherine Mermet, John P. Spaulding	$8 00
Twelve blooms of Meteor, Charles V. Whitten	8 00
Twelve blooms of Mme. Hoste, Charles V. Whitten	8 00
Twelve blooms of The Bride, the Second prize to John P. Spaulding	6 00
Pansies.— Forty-eight cut blooms, not less than twenty-four varieties, Denys Zirngiebel	4 00
Second, Denys Zirngiebel	3 00
Third, George M. Anderson	2 00
Violets.— Best collection of varieties, fifty blooms of each in a bunch, Harry S. Rand	4 00
Second, Nathaniel T. Kidder	3 00
Third, Bussey Institution	2 00
Carnations.— Twelve blooms of any named crimson variety, E. G. Bridge, Ferdinand Mangold	3 00
Second, George Sanderson, Ferdinand Mangold	2 00
Twelve blooms of any named Pink variety, William Nicholson, Nicholson	3 00
Second, Lucius H. Foster, Daybreak	2 00
Twelve blooms of any named Scarlet variety, E. G. Bridge, Hector	3 00
Second, Frederick A. Blake, Col. Wilder	2 00
Twelve blooms of any named White variety, E. G. Bridge, Lizzie McGowan	3 00
Second, Frederick A. Blake, Lizzie McGowan	2 00
Twelve blooms of any named Yellow variety, J. Tailby & Son, Henrietta Sargent	3 00
Second, H. K. Southworth, Buttercup	2 00
Centre Piece.— Mrs. E. M. Gill	10 00
Second, Mrs. A. D. Wood	8 00

Gratuities: —

Francis Brown Hayes, Collection of Roses and Rhododendrons	7 00
E. Sheppard & Son, Dendrobiums and Carnations	2 00
Peter Fisher & Co., Vase of Carnation Jacqueminot	1 00
Francis Brown Hayes, Pyramid of Wistaria	10 00
Arthur H. Fewkes, Antirrhinums	3 00
Bussey Institution, Andromeda and Cypripediums	2 00
David Allan, *Cymbidium Lowianum*	2 00
Harry S. Rand, Sweet Peas	1 00
Charles E. Richardson, Tricolor Geranium foliage	1 00
Mrs. A. D. Wood, Cut Flowers	3 00
Mrs. E. M. Gill, " "	2 00

April 7.

Gratuities : —

Francis Brown Hayes, Roses and Wistaria	$3 00
George M. Anderson, Tea Roses	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

April 14.

Gratuities : —

Francis Brown Hayes, Wistaria and Lilies	2 00
Bussey Institution, Forced *Cypripedium spectabile*	2 00
R. & J. Farquhar & Co., *Heuchera sanguinea* and Double Pyrethrums	1 00
Mrs. A. D. Wood, Carnations, etc.	2 00

April 21.

Gratuities : —

Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Flowers	1 00

April 28.

Gratuities : —

R. & J. Farquhar & Co., Narcissuses	3 00
Bussey Institution, Daffodils, etc.	2 00
Francis Brown Hayes, Cut Flowers	2 00
Mrs. A. D. Wood, " "	2 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Flowers	1 00
Mrs. Mary E. Loud, " "	1 00

MAY EXHIBITION.

May 5.

Tulips.— Twenty-four blooms, distinct named varieties, John L. Gardner	6 00
Hardy Narcissuses.— Collection of not less than ten named varieties of blooms, R. & J. Farquhar & Co.	6 00
Second, Bussey Institution	5 00
Third, John L. Gardner	4 00
Pansies.— Forty-eight cut blooms, not less than twenty-four varieties, Denys Zirngiebel	4 00
Second, Denys Zirngiebel	3 00
Third, Hon. Joseph S. Fay	2 00
Herbaceous Plants.— Thirty bottles, Nathaniel T. Kidder	8 00
Native Plants.— Collection, not exceeding thirty bottles, George H. Grinnell	5 00
Second, Mrs. P. D. Richards	4 00
Third, Misses Eleanor A., and Mollie S. Doran	3 00

Gratuities : —

William Nicholson, Carnations	$1 00
R. & J. Farquhar & Co., *Heuchera sanguinea*	1 00
Rea Brothers, Herbaceous Plants	2 00
Bussey Institution, Shrubs and Herbaceous Plants	2 00
Francis Brown Hayes, Collection of Flowers	3 00
Mrs. A. D. Wood, Cut Flowers	3 00
Mrs. E. M. Gill, " "	1 00

MAY 12.

Gratuities : —

J. W. Manning, Herbaceous Plants	3 00
Mrs. A. D. Wood, Cut Flowers	3 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Flowers	1 00
Misses C. M. Endicott, and M. C. Hewett, Wild Flowers	1 00
Mrs. Mary E. Loud, " "	1 00
George H. Grinnell, " "	1 00

MAY 19.

Gratuities : —

J. W. Manning, Herbaceous Plants	2 00
Francis Brown Hayes, Display of Flowers	4 00
Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Flowers	1 00
Mrs. Mary E. Loud, " "	1 00
Misses C. M. Endicott and M. C. Hewett, Wild Flowers	1 00

MAY 26.

Gratuities : —

Francis Brown Hayes, Display of Flowers	4 00
Walter H. Cowing, Hybrid Aquilegias	2 00
Leverett M. Chase, Viburnum and Globe Flowers	1 00
J. W. Manning, Herbaceous Plants	2 00
Rea Brothers, " "	1 00
Mrs. E. M. Gill, Cut Flowers	1 00
Mrs. P. D. Richards, Wild Flowers	1 00
Mrs. Mary E. Loud, " "	1 00

JUNE 2.

Gratuities : —

H. H. Hunnewell, Display of Rhododendrons	5 00
E. G. Bridge, Vase of Carnation Hector	1 00
Walter H. Cowing, Display of Clematis	1 00
Charles V. Whitten, Pyrethrums	1 00
Leverett M. Chase, Viburnums	1 00

William C. Strong, German Irises and Pyrethrums $1 00
Mrs. A. D. Wood, *Hemerocallis flava* and *Papaver orientale* . . 1 00
J. W. Manning, Herbaceous Plants 2 00
Francis Brown Hayes, Display of Flowers 5 00
Misses C. M. Endicott, and M. C. Hewett, Wild Flowers . . 1 00

RHODODENDRON SHOW.

June 6 and 7.

H. H. Hunnewell Premiums.

Rhododendrons.— Twelve distinct Hardy varieties, named, Samuel J. Trepess, a piece of plate, value 20 00
Second, John L. Gardner, a piece of plate, value . . . 15 00
Six distinct Hardy varieties, named, Samuel J. Trepess . . 10 00
Second, John L. Gardner 5 00
Eighteen Tender varieties, named, Francis Brown Hayes . . 10 00
Six Tender varieties, named, Francis Brown Hayes . . . 5 00
Three Tender varieties, named, Francis Brown Hayes . . . 4 00
Single truss of any Tender variety, named, Francis Brown Hayes 2 00
Hardy Azaleas.— From any or all classes, fifteen varieties, one vase of each, Francis Brown Hayes 8 00
Second, Thomas C. Thurlow 5 00
Twelve varieties, one vase of each, Thomas C. Thurlow . . 4 00
Six varieties, one vase of each, John L. Gardner 3 00
Cluster of trusses, one variety, Francis Brown Hayes . . . 2 00

Society's Prizes.

German Irises.— Six distinct varieties, one spike of each, John L. Gardner 3 00
Second, Walter H. Cowing 2 00
Hardy Pyrethrums.— Display, Charles V. Whitten . . . 3 00
Second, Francis Brown Hayes 2 00
Third, Shady Hill Nursery Co. 1 00
Hardy Flowering Trees and Shrubs.— Collection of thirty species and varieties, named, cut blooms, the Second prize to Alice L. Grinnell 6 00
Herbaceous Plants.— Thirty bottles, J. W. Manning . . . 8 00
Second, Shady Hill Nursery Co. 6 00
Basket of Flowers.— Mrs. A. D. Wood 5 00
Second, Mrs. E. M. Gill 4 00
Native Plants.— Collection, not exceeding thirty bottles, of named species and varieties, Misses C. M. Endicott, and M. C. Hewett 5 00
Second, Mrs. P. D. Richards 4 00
Third, George H. Grinnell 3 00

Gratuities: —

H. H. Hunnewell, Display of Rhododendrons, Azaleas, etc.	$15 00
Francis Brown Hayes, Display of Rhododendrons, Azaleas, etc.	15 00
John L. Gardner, Collection of Rhododendrons	4 00
E. Sheppard & Son, Rhododendrons, Azaleas, and Pelargoniums	3 00
O. B. Hadwen, Rhododendrons and Pæonies	1 00
Thomas C. Thurlow, Five varieties of English Oaks and Hardy Azaleas	2 00
Moses T. Stevens, German Irises	2 00
Walter H. Cowing, " " and Aquilegias	2 00
William C. Strong, " " and Pyrethrums	1 00
Mary T. Goddard, Seedling Clematis	1 00
Robert Manning, " " (originated by Joseph H. Woodford)	1 00
Jackson Dawson, Forty species and varieties of Roses	5 00
William Nicholson, Carnations	2 00
H. K. Southworth, "	1 00
Walter E. Coburn, Pelargoniums	1 00
Isaac E. Coburn, Pansies	1 00
Mrs. A. A. Johnson, *Kalmia latifolia*	1 00
George Chase, *Viburnum tomentosum* and *Magnolia hypoleuca*	2 00
Hon. Joseph S. Fay, Hardy flowering Trees and Shrubs	10 00
Rea Brothers, Herbaceous Plants	1 00
Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. E. M. Gill, " "	2 00

JUNE 9.

Gratuities: —

L. T. Seaver, Ruffled Pansies	1 00
E. G. Bridge, Vase of Carnations Ferdinand Mangold	1 00
Mrs. C. Ramsdell, German Irises	1 00

JUNE 16.

Prizes postponed from Rhododendron Show.

HERBACEOUS PÆONIES. — Twelve named varieties, Arthur H. Fewkes	10 00
Second, James F. C. Hyde	8 00
Third, John L. Gardner	6 00

Gratuities: —

Thomas C. Thurlow, Seventy-five named varieties of Pæonies	8 00
Edward B. Wilder, Pæonies	2 00
William C. Strong, "	2 00
George Hollis, "	2 00
" " Seedling Pæonies	2 00
Hon. Joseph S. Fay, "	1 00

Mrs. E. M. Gill, Pæonies, Roses, etc.	$4 00
Mrs. A. D. Wood, Pæonies	1 00
Francis Brown Hayes, Rhododendrons and Roses	5 00
Sumner Coolidge, Hybrid Roses	1 00
E. G. Bridge, Vase of Carnation Hector	1 00
Walter H. Cowing, Spanish Irises	1 00
L. T. Seaver, Ruffled Pansies	1 00
Rea Brothers, Herbaceous Plants	2 00
J. W. Manning, " "	2 00
Mrs. P. D. Richards, Wild Flowers	1 00

ROSE EXHIBITION.

June 20 and 21.

Special Prizes, Theodore Lyman Fund.

Hardy Roses.—Twenty-four distinct named varieties, three of each variety, Hon. Joseph S. Fay, a piece of plate, value	35 00
Second, Dr. C. G. Weld, a piece of plate, value	30 00
Third, Mrs. J. Warren Clark, a piece of plate, value	25 00

Special Prizes, offered by the Society.

Six blooms of Alfred Colomb, Sumner Coolidge	5 00
Second, Dr. C. G. Weld	4 00
Six blooms of Baroness Rothschild, Dr. C. G. Weld	5 00
Second, Sumner Coolidge	4 00
Six blooms of John Hopper, Hon. Joseph S. Fay	5 00
Second, Francis Brown Hayes	4 00
Six blooms of Merveille de Lyon, the Second prize to Sumner Coolidge	4 00
Six blooms of Mme. Gabriel Luizet, Francis Brown Hayes	5 00
Second, Hon. Joseph S. Fay	4 00
Six blooms of Mme. Victor Verdier, Dr. C. G. Weld	5 00
Six blooms of Prince Camille de Rohan, Hon. Joseph S. Fay	5 00
Twelve blooms of any other variety, Hon. Joseph S. Fay, Gen. Jacqueminot	7 00
Second, Hon. Joseph S. Fay, Ulrich Brunner	5 00
Third, " " " " Magna Charta	4 00
Fourth, Sumner Coolidge, Mrs. John Laing	3 00

Regular Prizes.

Sixteen distinct named varieties, three of each variety, Hon. Joseph S. Fay	20 00
Second, J. Eaton, Jr.	15 00

Twelve distinct named varieties, three of each variety, the Second prize to Hon. Joseph S. Fay	$10 00
Six distinct named varieties, three of each variety, Hon. Joseph S. Fay	15 00
Second, Dr. C. G. Weld	10 00
Three distinct named varieties, three of each variety, Hon. Joseph S. Fay	10 00
Second, Dr. C. G. Weld	8 00
Third, John L. Gardner	5 00
Twenty-four distinct named varieties, one of each variety, Hon. Joseph S. Fay	15 00
Second, J. Eaton, Jr.	10 00
Third, William H. Spooner	8 00
Eighteen distinct named varieties, one of each variety, Hon. Joseph S. Fay	12 00
Second, Dr. C. G. Weld	8 00
Twelve distinct named varieties, one of each variety, Dr. C. G. Weld	10 00
Second, Francis Brown Hayes	6 00
Third, Hon. Joseph S. Fay	4 00
Six distinct named varieties, one of each variety, Hon. Joseph S. Fay	6 00
Second, John L. Gardner	4 00
Third, Dr. C. G. Weld	3 00
Three distinct named varieties, one of each variety, Francis Brown Hayes	3 00
Second, Hon. Joseph S. Fay	2 00
Twelve blooms of not less than four varieties introduced since 1891, Hon. Joseph S. Fay	10 00
Moss Roses.— Six distinct named varieties, three clusters of each, Hon. Joseph S. Fay	6 00
Second, John L. Gardner	4 00
Hybrid Tea Roses.— Six named varieties, buds admissible, Hon. Joseph S. Fay	6 00
General Display.— One hundred bottles of Hardy Roses, buds admissible, Francis Brown Hayes	10 00
Second, Mrs. J. Warren Clark	9 00
Third, John L. Gardner	8 00
Fourth, Mrs. E. M. Gill	7 00
Fifth, William H. Spooner	6 00
Sweet Williams.— Thirty spikes, not less than six distinct varieties, Walter H. Cowing	3 00
Second, Frederick S. Davis	2 00
Vase of Flowers.— Best arranged, in one of the Society's glass vases, Mrs. E. M. Gill	5 00
Second, Mrs. A. D. Wood	4 00

Gratuities: —

Hon. Joseph S. Fay, Display of Roses	$25 00
William H. Spooner, Roses	5 00
John L. Gardner, "	5 00
J. Eaton, Jr., "	3 00
Dr. C. G. Weld, "	3 00
Francis Brown Hayes, Roses and Rhododendrons	10 00
Mrs. E. M. Gill, Roses and Cut Flowers	4 00
Thomas C. Thurlow, Fifty varieties of Pæonies	5 00
O. B. Hadwen, Pæonies	2 00
Walter E. Coburn, Pelargoniums	3 00
E. Sheppard & Son, "	1 00
R. & J. Farquhar & Co., Delphiniums	2 00
E. Sheppard & Son, Sweet Williams	2 00
George Hollis, Foxgloves	1 00
Bussey Institution, Foxgloves, Sweet Williams, and Lilies	3 00
Walter H. Cowing, Poppies, Spanish Irises, and Sweet Williams	3 00
L. T. Seaver, Pansies	1 00
Rea Brothers, Herbaceous Plants	2 00
Mrs. Mary T. Goddard, Cut Flowers	3 00
Mrs. A. D. Wood, " "	2 00
Mrs. P. D. Richards, Wild Flowers	1 00
Misses C. M. Endicott and M. C. Hewett, Wild Flowers	1 00

JUNE 30.

HARDY ROSES. — Collection, filling fifty vases, one rose in each vase, Hon. Joseph S. Fay	20 00
Second, Hugh Williamson	15 00
Third, Francis Brown Hayes	10 00
Fourth, J. Eaton, Jr.	6 00
IRIS KÆMPFERI. — Fifteen varieties, three of each, in vases, John L. Gardner	6 00
Six varieties, three of each, in vases, John L. Gardner	4 00
Second, Frederick S. Davis	3 00
ENGLISH IRISES. — Best collection, Walter H. Cowing	3 00
DELPHINIUMS. — Collection of twenty spikes, Nathaniel T. Kidder	5 00
Second, John L. Gardner	4 00
Third, Hon. Joseph S. Fay	3 00
LILIUM CANDIDUM. — Twelve spikes, Samuel Hartwell	4 00
Second, Miss Mary S. Walker	3 00
Third, Frederick S. Davis	2 00
CAMPANULAS. — Collection, not less than twelve bottles, Rea Brothers	3 00
FOXGLOVES. — Twelve spikes, the Second prize to Walter H. Cowing	2 00
HERBACEOUS PLANTS. — Forty bottles, Nathaniel T. Kidder	8 00
Second, Shady Hill Nursery Co.	6 00
BASKET OF FLOWERS. — Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00

Gratuities: —

Hon. Joseph S. Fay, Hybrid Roses	$7 00
William H. Spooner, Roses	1 00
Charles W. Parker, "	1 00
Francis Brown Hayes, Roses, Orchids, etc.	3 00
Mrs. E. M. Gill, Hybrid Roses and Cut Flowers	2 00
R. & J. Farquhar & Co., Delphiniums	1 00
John L. Gardner, Campanulas	1 00
Walter H. Cowing, Sweet Williams and Poppies	2 00
Rea Brothers, Herbaceous Plants	2 00
Mrs. A. D. Wood, Cut Flowers	1 00
Mrs. P. D. Richards, Wild Flowers	1 00
Lawrence H. Parker, " "	1 00

JULY 7.

VASE OF FLOWERS.— Best arranged, in one of the Society's glass vases, Mrs. E. M. Gill	4 00
Second, Mrs. A. D. Wood	3 00
NATIVE PLANTS.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, George H. Grinnell	4 00
Third, Lawrence H. Parker	3 00

Gratuities: —

Hon. Joseph S. Fay, Roses and Delphiniums	5 00
E. Sheppard & Son, *Iris Kæmpferi*	2 00
John L. Gardner, " "	2 00
Sumner Coolidge, Hollyhocks	1 00
Walter E. Coburn, Pelargoniums	1 00
Francis Brown Hayes, Collection of Flowers	5 00
Rea Brothers, Herbaceous Plants	1 00
Mrs. Mary E. Loud, Wild Flowers	1 00

JULY 14.

HOLLYHOCKS.— Double, twelve blooms, of twelve distinct colors, Joseph Burnett	5 00
Second, Francis Brown Hayes	4 00
Third, Hon. Joseph S. Fay	3 00
Six blooms, of six distinct colors, Joseph Burnett	3 00
Second, Hon. Joseph S. Fay	2 00
Third, " " " "	1 00
Twelve spikes, Joseph Burnett	5 00
Second, " "	4 00
PARLOR BOUQUET.— Francis Brown Hayes	4 00
Second, Mrs. E. M. Gill	3 00
Third, Mrs. A. D. Wood	2 00

Gratuities : —

Joseph Burnett, Hollyhocks	$10 00
Hon. Joseph S. Fay, Eight dishes of Hollyhocks	2 00
A. H. Messer, Hollyhocks	1 00
Francis Brown Hayes, Hollyhocks, etc.	4 00
Frederick A. Blake, Thirty-one named varieties of Sweet Peas	2 00
Mrs. A. D. Wood, Sweet Peas, etc.	2 00
Joseph Burnett, Zinnias	1 00
Rea Brothers, Herbaceous Plants	1 00
Mrs. E. M. Gill, Cut Flowers	2 00
Mrs. P. D. Richards, Wild Flowers	2 00
Lawrence H. Parker, " "	1 00

JULY 21.

GLOXINIAS.— Display of Cut Flowers, John P. Spaulding	4 00
Second, Moses T. Stevens	3 00
NATIVE FERNS.— Best display, Mrs. P. D. Richards	5 00
Second, Mrs. Mary E. Loud	4 00

Gratuities : —

Francis Brown Hayes, Hollyhocks	1 00
Frederick A. Blake, Petunias	2 00
Walter E. Coburn, Tuberous Begonias, etc.	1 00
Rea Brothers, Herbaceous Plants	1 00
Francis Brown Hayes, Collection of Flowers	3 00
Mrs. A. D. Wood, Cut Flowers	1 00
Mrs. E. M. Gill, " "	1 00

JULY 28.

SWEET PEAS.— Display, filling thirty vases, Frederick A. Blake	6 00
Second, Walter Russell	4 00
Display of named varieties in vases, six blooms in each vase, H. B. Watts	4 00
Second, Frederick A. Blake	3 00
HERBACEOUS PLANTS.— Forty bottles, Nathaniel T. Kidder	8 00
BASKET OF FLOWERS.— Mrs. E. M. Gill	4 00

Gratuities : —

E. Sheppard & Son, Hollyhocks	1 00
David Allan, Hollyhocks, etc.	1 00
L. W. Goodell, Petunias	3 00
Frederick A. Blake, Salpiglossis	1 00
Rea Brothers, Herbaceous Plants	1 00
Francis Brown Hayes, Cut Flowers	3 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Flowers	1 00
Mrs. Mary E. Loud, " "	1 00

August 4.

Nymphæas.— Collection, with foliage, Dr. R. H. Faunce	$10 00
Second, L. W. Goodell	8 00
Nelumbiums.— Collection, with foliage, Dr. R. H. Faunce	6 00
Second, L. W. Goodell	5 00
Perennial Phloxes.— Ten distinct named varieties, Thomas C. Thurlow	5 00
Second, Nathaniel T. Kidder	4 00
Third, Rea Brothers	3 00
Vase of Flowers.— Mrs. E. M. Gill	4 00
Second, Mrs. A. D. Wood	3 00
Native Flowers.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, Misses C. M. Endicott and M. C. Hewett	4 00
Third, Misses Eleanor A. and Mollie S. Doran	3 00

Gratuities: —

Thomas C. Thurlow, Collection of Phloxes	5 00
Walter H. Cowing, Cannas	2 00
W. N. Craig, Asters	1 00
John L. Gardner, Gladioli and Montbretia	2 00
Elisha S. Converse, Begonias, etc.	1 00
Rea Brothers, Herbaceous Plants	1 00
Francis Brown Hayes, Collection of Flowers	3 00
Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. S. H. Coleman, " "	1 00
Mrs. Mary T. Goddard, Cut Flowers	1 00
Walter E. Coburn, " "	1 00

August 11.

Gladioli.— Twenty named varieties, in spikes, Francis Brown Hayes	6 00
Ten named varieties, in spikes, John L. Gardner	3 00
Second, Francis Brown Hayes	2 00
Six named varieties, in spikes, John Parker	2 00
Display of named and unnamed varieties, filling one hundred vases, J. Warren Clark	8 00
Second, John P. Spaulding	6 00
Third, Richard T. Lombard	4 00
Phlox Drummondi.— Thirty vases, not less than six varieties, Francis Brown Hayes	4 00
Second, Frederick A. Blake	3 00
Third, Mrs. Mary T. Goddard	2 00

Gratuities: —

Rea Brothers, Sixteen named varieties of Phlox	2 00
Walter H. Cowing, *Lilium auratum*	3 00

Bussey Institution, Sweet Peas	$2 00
C. H. Childs, Zinnias	1 00
John Parker, Display of Flowers	1 00
John L. Gardner, Vase of Montbretia	1 00
David Allan, Roses, etc.	1 00
Francis Brown Hayes, Cut Flowers	4 00
Mrs. A. D. Wood, " "	2 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Flowers	1 00

August 18.

Gratuities: —

Francis Brown Hayes, Roses	3 00
J. Warren Clark, Gladioli	3 00
Walter H. Cowing, Lemoine's Gladioli	2 00
Bussey Institution, Tuberous Begonias, Gloxinias, and Achimenes	2 00
C. E. Weld, " "	2 00
Elisha S. Converse, " "	1 00
George Hollis, Eighteen varieties of Phlox	2 00
Frederick A. Blake, Stocks and Phlox	1 00
Adin A. Hixon, Sweet Peas and Petunias	1 00
John P. Spaulding, Cannas and Sweet Peas	1 00
Joseph Clark, Heaths	1 00
Rea Brothers, Herbaceous Plants	1 00
Francis Brown Hayes, Cut Flowers	2 00
John Parker, " "	1 00
Mrs. E. M. Gill, " "	1 00
Mrs. A. D. Wood, " "	1 00
Mrs. P. D. Richards, Wild Flowers	1 00

August 25.

Asters.— Large flowered, of all classes, fifty vases, not less than twelve varieties, three flowers in each vase, Mrs. Mary T. Goddard	5 00
Second, F. P. Alexander	4 00
Truffaut's Pæony Flowered, thirty blooms, not less than twelve varieties, Bussey Institution	5 00
Second, Mrs. Mary T. Goddard	4 00
Victoria Flowered, thirty blooms, not less than twelve varieties, John L. Gardner	5 00
Second, Nathaniel T. Kidder	4 00
Herbaceous Plants.— Forty bottles, Nathaniel T. Kidder	8 00

Gratuities: —

Frederick W. Vanderbilt, Asters	2 00
George Hollis, Thirty-five species of Asters	1 00
J. Warren Clark, Display of Gladioli	3 00

Frederick S. Davis, Lilliput Zinnias, etc.	$1 00
Edwin S. Hill, Dahlias and Petunias	1 00
Walter E. Coburn, Petunias and Begonias	1 00
Rea Brothers, Herbaceous Plants	1 00
John L. Gardner, Display of Flowers	5 00
Francis Brown Hayes, Display of Flowers	4 00
Mrs. E. M. Gill, Cut Flowers	2 00
John Parker, " "	1 00
Mrs. P. D. Richards, Wild Flowers	2 00
George H. Grinnell, " " and Fruits	2 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

SEPTEMBER 5 AND 6.

Special Prize, Theodore Lyman Fund.

AQUATIC PLANTS.— Display, including not less than twelve flowers of Nymphæas and Nelumbiums, Hon. John Simpkins	30 00
Second, Daniel D. Lee	20 00
Third, L. W. Goodell	10 00

Regular Prizes.

ASTERS.— Collection of fifty varieties, one flower in each vase, preference being given to the collection containing the greatest number of classes, L. W. Goodell	5 00
Second, Sumner Coolidge	4 00
Third, Charles H. Yates	3 00
DAHLIAS.— Double, twelve blooms, distinct named varieties, John Parker	6 00
Second, L. W. Snow	5 00
Third, William C. Winter	4 00
Six blooms, distinct named varieties, L. W. Snow	4 00
Second, John Parker	3 00
Third, Lawrence H. Parker	2 00
Specimen bloom, John Parker, for James Crocker	2 00
Second, William C. Winter, for Black Knight	1 00
Lilliputian, display, twenty-five bottles, not less than eight named varieties, William C. Winter	4 00
Second, William C. Winter	3 00
Third, L. W. Snow	2 00
LILIUM LANCIFOLIUM.— Collection of named varieties, Sumner Coolidge	4 00
TROPÆOLUMS.— Display filling twenty-five vases, Dr. C. G. Weld	4 00
Second, William Patterson	3 00
Third, A. L. Cain	2 00

Marigolds.— Display of French and African, filling twenty-five vases, Francis Brown Hayes	$3 00
Second, Bussey Institution	2 00
Cannas.— Collection of not less than ten named varieties, in spikes, with foliage, David Fisher	10 00
Second, Walter H. Cowing	8 00
Tuberous Begonias.— Twenty-five spikes, not less than four varieties, kept fresh during the exhibition, C. E. Weld	5 00
Second, Elisha S. Converse	4 00
Third, Albert H. Brown	3 00
Double Zinnias.— Twenty-five flowers, not less than six varieties, L. W. Goodell	4 00
Second, Francis Brown Hayes	3 00
Third, Dr. C. G. Weld	2 00
Single Dianthus.— Collection of Annual and Biennial varieties, filling fifty bottles, Francis Brown Hayes	4 00
Basket of Flowers. – Best arranged, Mrs. E. M. Gill	4 00
Native Plants.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, George H. Grinnell	4 00
Third, Misses Eleanor A. and Mollie S. Doran	3 00

Gratuities: —

William W. Lee, Display of Nymphæas	4 00
Warren W. Rawson, Display of Dahlias	4 00
William C. Winter, " " "	2 00
H. F. Burt, " " "	1 00
James S. Cowles, Newport, R. I., Display of Canna Mrs. Fairman Rogers	4 00
Albert H. Brown, Tuberous Begonias	1 00
Walter E. Coburn, Petunias	1 00
Joseph H. White, *Monstera deliciosa*	1 00
E. Sheppard & Son, Gladioli, etc.	1 00
M. S. Stevens, Asters, Zinnias, etc.	1 00
Thomas C. Thurlow, Perennial Phlox and Delphiniums	1 00
Rea Brothers, Herbaceous Plants	1 00
Francis Brown Hayes, Collection of Cut Flowers	4 00
Mrs. E. M. Gill, Cut Flowers	1 00

September 15.

Herbaceous Plants.— Forty bottles, Nathaniel T. Kidder	8 00

Gratuity: —

Harvard Botanic Garden, Herbaceous Plants	5 00

SEPTEMBER 22.

PERENNIAL ASTERS.— Display of Native or Introduced species and varieties, George Hollis	5 00
Second, Mrs. P. D. Richards	4 00

OCTOBER 20.

Gratuity : —

Hon. John Simpkins, Two vases of Chrysanthemums, Ivory and H. L. Sunderbruch	5 00

CHRYSANTHEMUM SHOW.

NOVEMBER 6, 7, 8, AND 9.

Special Prizes, from the Josiah Bradlee Fund.

Twenty-five blooms, of twenty-five distinct varieties, named, Hon. John Simpkins, a piece of plate, value	20 00
Second, W. Slack, Stamford, Conn., a piece of plate, value	15 00
Third, Joseph H. White, a piece of plate, value	10 00
Six vases, of six named varieties, ten blooms of each, Waban Rose Conservatories	30 00
Second, Charles V. Whitten	25 00

Special Prizes, offered by the Society.

Best Seedling, never disseminated, three blooms, Pink, Patrick Melia, for Nonantum	5 00
Best Seedling, never disseminated, three blooms, White, Hugh Graham & Son, Philadelphia, Pa., for Philadelphia	5 00
Best Seedling, never disseminated, three blooms, Yellow, Pitcher & Manda, Short Hills, N. J., for Mrs. W. H. Bryant	5 00
Best Seedling, never disseminated, Incurved, of any color, three blooms, T. D. Hatfield, for Mrs. T. D. Hatfield	5 00

Regular Prizes.

Twelve cut blooms, Incurved, named, Joseph H. White	10 00
Second, Mrs. A. D. Wood	6 00
Twelve cut blooms, Japanese, named, W. Slack, Stamford, Conn.	10 00
Second, Hon. John Simpkins	6 00
Third, Mrs. A. D. Wood	4 00
Twelve cut blooms, Japanese Incurved, named, Hon. John Simpkins	10 00
Second, W. Slack	6 00
Third, Joseph H. White	4 00

Twelve cut blooms, Anemone, named, W. Slack	$10 00
Six cut blooms, Incurved, named, W. Slack	6 00
Six cut blooms, Japanese, named, Joseph H. White	6 00
Second, W. Slack	4 00
Third, James Nicol	2 00
Six cut blooms, Japanese Incurved, named, Hon. John Simpkins	6 00
Second, Elisha S. Converse	4 00
Six cut blooms, Reflexed, named, W. Slack	6 00
Second, Joseph H. White	4 00
Third, Elisha S. Converse	2 00
Twelve best varieties, named, introductions of the current year, Hon. John Simpkins	8 00
Second, Mrs. A. D. Wood	6 00
Vase of blooms, on long stems, arranged in the Society's large China Vases, Hon. John Simpkins	18 00
Second, Hon. John Simpkins	16 00
Third, Francis Brown Hayes	14 00
Fourth, J. W. Howard	12 00
Fifth, Joseph H. White	10 00
Best vase of ten blooms, on long stems, Red, named, Waban Rose Conservatories, E. Molyneux	10 00
Best vase of ten blooms, on long stems, Pink, named, Waban Rose Conservatories, Viviand Morel	10 00
Second, Waban Rose Conservatories, Mermaid	8 00
Third, Mrs. Benjamin P. Cheney, Viviand Morel	6 00
Best vase of ten blooms, on long stems, White, named, Waban Rose Conservatories, Mrs. Jerome Jones	10 00
Second, Waban Rose Conservatories, Mutual Friend	8 00
Best vase of ten blooms, on long stems, Yellow, named, Waban Rose Conservatories, Eugene Dailledouze	10 00
Second, Waban Rose Conservatories, H. L. Sunderbruch	8 00
Third, Mrs. A. D. Wood, Golden Wedding	6 00
Best vase of ten blooms, on long stems, any other color, named, J. Eaton Jr., Clarence	10 00
Second, Elisha S. Converse, Hicks Arnold	8 00
Third, L. W. Goodell, Robert M. Gray	6 00

Gratuities:—

William Edgar, Five vases of Chrysanthemums	8 00
Mrs. Benjamin P. Cheney, Collection of Chrysanthemums	6 00
Francis Brown Hayes, " " "	5 00
Mrs. E. M. Gill, Chrysanthemums	2 00
Mann Brothers, Two vases of Chrysanthemum Mutual Friend	2 00
L. W. Goodell, Vase of blooms of Chrysanthemum Florence Pullman	1 00
Francis Brown Hayes, Two vases of Chrysanthemum James Comley	1 00
George Putnam School, Hardy Chrysanthemums	1 00

Richard T. Lombard, Collection of Carnations	$3 00
Mann Brothers, Six vases of Carnations	3 00
William Nicholson, Three vases of Carnations	2 00
Peter Boll. Vase of Roses, American Beauty	4 00
R. & J. Farquhar & Co., New Violet, Farquhar	1 00
R. & J. Farquhar & Co., Collection of Cannas	2 00

NOVEMBER 17.

Gratuities:—

Francis Brown Hayes, Chrysanthemums	2 00
Mrs. E. M. Gill, "	1 00

DECEMBER 8.

Gratuity:—

George McWilliam, *Daphne Indica* and *Luculia gratissima*	1 00

DECEMBER 29.

Gratuity:—

C. W. Ward, Queens, N. Y., Carnations	3 00

SOCIETY'S SILVER MEDAL.

June 16. Jackson Dawson, Hybrid *Rosa multiflora.*

APPLETON SILVER MEDAL.

Nathaniel T. Kidder, Best Collection of Herbaceous Plants, exhibited at stated times during the season as specified in the Schedule.

FIRST CLASS CERTIFICATES OF MERIT.

January 20. William Robinson, Hybrid *Selenipedium Helene.*

" " Mrs. Frederick L. Ames, Hybrid *Lælia Digbyana Mossiæ.*

" " Mrs. Frederick L. Ames, new *Lælia anceps* var. *Schroderæ.*

April 14. Warren H. Manning, *Cornus stolonifera aurea.*

May Exhibition, May 5. Jackson Dawson, *Spiræa angusta.*

" " " " " " *Prunus spinosus flore plena.*

Rose Exhibition, June 20. Bussey Institution, *Ostrowskya magnifica.*

" " " " Denys Zirngiebel, Improved Candytuft.

Annual Exhibition of Flowers, etc., September 5. Hon. John Simpkins *Nymphæa delicatissima.*

" " " " " " Hon. John Simpkins *Nymphæa Deaniana.*

" " " " " " Oasis Nursery Co., Tuberous Begonia.

" " " " " " R. & J. Farquhar & Co., New Cannas.

Annual Exhibition of Fruits, etc., October 6. Walter Hunnewell, Chrysanthemum Mrs. E. G. Hill.

" " " " October 20. T. D. Hatfield. Seedling Chrysanthemum, Mrs. T. D. Hatfield.

Chrysanthemum Show, November 6. Siebrecht & Wadley, New Rochelle, N. Y., New Rose, Belle Siebrecht.

" " " " George B. Gill, Seedling Chrysanthemum, Ox Blood.

November 17. Norris F. Comley, Seedling Chrysanthemum, Francis B. Hayes.

COMPLIMENTARY NOTICES.

Rhododendron Show, June 6. Mrs. Mary T. Goddard, Seedling Clematis.

" " August 4. Dr. R. H. Faunce, Seedling variety of *Nymphæa odorata.*

Annual Exhibition, September 5. P. Bisset, Washington, D. C., Seedling Nymphæas.

Chrysanthemum Show, November 6. Calvin S. Goddard, Seedling Chrysanthemum, Calvin S. Goddard.

" " " " George Hollis, Seedling Chrysanthemum, Golden Rule.

" " " " J. Eaton, Jr., Seedling Chrysanthemum, Penikese.

" " " " Patrick Melia, Seedling Chrysanthemum, October Queen.

" " " " Henry A. Gane, Seedling Chrysanthemum, Mrs. George A. Gane.

" " " " Henry A. Gane, Seedling Chrysanthemum, Mrs. Louise P. Chard.

" " " " Kenneth Finlayson, Sport, Mrs. E. B. Freeman.

" " " " Sewall Fisher, Seedling Carnation, No. 162.

" " " " Sewall Fisher, Seedling Carnation, Crystal.

December 29. Frederick Dorner, Lafayette, Ind., Seedling Carnation, Meteor.

" " Frederick Dorner, Seedling Carnation, Bridesmaid.

REPORT

OF THE

COMMITTEE ON FRUITS,

FOR THE YEAR 1894.

By E. W. WOOD, Chairman.

The fruit exhibits during the year 1894 have been larger in all classes and the prizes more nearly all awarded than in any previous year within the experience of the present Committee. The small fruits suffered less than usual during the winter, and, with the exception of some localities, and in light soil where they were more or less injured by drought, produced more than an average crop. The tree fruits have been unusually abundant and of excellent quality; this is especially true of the apple. The crop has been unusually large, the fruit of full average size, and remarkably smooth and free from imperfections.

Of pears there has been a full average crop, and there has been little or no complaint of blight, or of insects injuring the trees.

Peaches have been shown in larger quantities than in previous years, and a larger proportion have been seedling varieties; while there has not been any marked improvement in size or quality, the seedling trees would seem to be more reliable for a crop. There have been about the usual quantity of plums exhibited; the only serious obstacle to growing this fruit in this vicinity is the black knot, and the most successful remedy thus far discovered seems to be, carefully watching the trees, and painting over the warts, as they appear, with kerosene mixed with whiting or plaster, to the consistency of thick paint.

The dry weather was favorable for maturing and gathering the cherry crop, and there was much less waste than frequently happens from the fruit rotting on the trees. Of quinces there was an unusually large number of specimens shown at the Annual Exhibition of Fruits. The quantity, quality, and different varieties shown, indicate that more attention is being paid to their cultivation than formerly.

Considered in connection with other products of the soil, the fruit crop, both in quantity, and the value received for it, compares favorably with other products. The apple market has been materially benefited by the large amount exported to foreign markets, which is larger, up to the present time, than in any previous year at a corresponding date. Thousands of barrels of apples have gone to waste the past season. The quantity of windfalls was so large that the cider mills could not consume them, and if that had not been the case they could be more profitably used by the evaporating companies. Where these machines have been in operation, the proprietors have paid thirty cents per bushel for windfalls, which, without any expense for barrels or packing and heading, leaves a fair price for the fruit. Owing to the drought a larger proportion than usual fell from the trees, and if all that were suitable could have been evaporated, it would have furnished employment for many laborers, and added an important item to the fruit growers' receipts.

The prices received for pears have not compared favorably with those for other fruits. The large quantity of this fruit received from California early in the season, much of which was sold at extremely low prices, produced an unfavorable effect on the market for home grown fruit. The prices for the small fruits compared favorably with previous years.

There have been no new fruits shown, requiring special mention. Ex-President Strong offered liberal special prizes, at the Strawberry Exhibition, for new varieties that had not previously been exhibited, but it did not result in bringing out anything equal to varieties now in general cultivation.

The Schedule of Prizes for 1895, if adopted by the Society as recommended by the Committee, will contain but few changes from that of the past season. It has been the endeavor of the Committee to include in the list of varieties for which premiums are offered, all that are desirable for general cultivation, either for

market or domestic use, and to arrange for their exhibition at such times as they can be shown to the best advantage; and as the invitation to exhibitors, and all others interested, to make any suggestions they might desire, as to changes in the Schedule, has met with very slight response, we can but infer that the present Schedule is generally satisfactory.

Of the $1800 appropriated for prizes and gratuities, the Committee have awarded $1,732, leaving an unexpended balance of $68.

E. W. Wood,
O. B. Hadwen,
C. F. Curtis,
J. W. Hill,
Samuel Hartwell,
Warren Fenno,

Committee on Fruits.

PRIZES AND GRATUITIES AWARDED FOR FRUITS.

January 6.

Gratuities:—

Edwin A Hall, Diel Pears	$1 00
N. N. Penny, Canaveral, Florida, Oranges	1 00

January 13.

Gratuities:—

Mrs. C. L. Morton, West Longwood, Florida, Oranges	1 00
Edwin A. Hall, Pears	1 00
Mrs. A. H. Lewis, Pears	1 00

February 3.

Gratuities:—

Edwin A. Hall, Collection of Pears	1 00
Calvin Terry, Cranberries	1 00

February 17.

Gratuities:—

Mrs. C. L. Morton, Oranges	2 00
George Frost, Oranges	1 00
Massachusetts Agricultural College, Apples and Grapes	3 00
Mrs. Mary E. Loud, Bermuda Fruits	1 00

March 10.

Gratuity:—

Mrs. C. L. Morton, Grape Fruit	1 00

March 17.

Gratuity:—

Elisha S. Converse, Strawberries	1 00

SPRING EXHIBITION.

March 28, 29, and 30.

Winter Apples.—Baldwin, E. R. Cook	3 00
Second, John L. Bird	2 00
Third, Charles M. Handley	1 00
Northern Spy, Rev. Calvin Terry	3 00
Second, William T. Hall	2 00
Third, Samuel Hartwell	1 00

Roxbury Russet, E. R. Cook	$3 00
Second, Cephas H. Brackett	2 00
Third, George Sanderson	1 00
Any other variety, E. R. Cook, Rhode Island Greening	3 00
Second, Charles M. Handley, Rhode Island Greening	2 00
Third, James H. Clapp, Lady's Sweet	1 00
WINTER PEARS.—Any variety, Edwin A. Hall, Winter Nelis	3 00
Second, Edwin A. Hall, Easter Beurre	2 00
STRAWBERRIES, one pint, Elisha S. Converse	3 00

APRIL 7.

Gratuity:—

William G. Prescott, Strawberries	1 00

MAY 5.

Gratuities:—

Edwin A. Hall, Collection of Pears	1 00
William Brown, Hothouse Peaches	1 00
William G. Prescott, Strawberries	1 00

JUNE 9.

Gratuities:—

Winter Brothers, Foreign Grapes	1 00
William C. Winter, Peaches	1 00

JUNE 16.

Gratuities:—

J. W. Howard, Marshall Strawberries	2 00
William G. Prescott, "	1 00
William C. Strong, "	1 00
Charles E. Grant, "	1 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 20 AND 21.

Special Prizes from the Theodore Lyman Fund.

STRAWBERRIES.— For the best four quarts of any variety, Warren Heustis & Son, Marshall, the Lyman Plate, value	20 00
Second, Marshall F. Ewell, Marshall, the Lyman Plate, value	16 00
Third, J. W. Howard, Marshall, the Lyman Plate, value	12 00
Fourth, George V. Fletcher, Marshall, the Lyman Plate, value	10 00
Fifth, Warren Heustis & Son, Belmont, the Lyman Plate, value	8 00

Special Prize offered by William C. Strong.

For the best two quarts of any variety not previously exhibited here, the Third prize to Isaac E. Coburn, Sanders	5 00

Special Prizes offered by the Society.

For the best two quarts of any variety, to be judged by points, Warren Heustis & Son, Belmont	$6 00
Second, Marshall F. Ewell, Marshall	5 00
Third, George V. Fletcher, Marshall	4 00
Fourth, Isaac E. Coburn, Jesse	3 00

Regular Prizes.

For the largest and best collection, not less than twenty baskets, of two quarts each, and not less than five varieties, George F. Wheeler	25 00
Second, Charles S. Pratt	20 00
Ten baskets, not less than three varieties, two quarts each, William C. Strong	15 00
Second, Isaac E. Coburn	12 00
Third, George F. Wheeler	10 00
Fourth, George V. Fletcher	8 00
Five baskets of one variety, two quarts each, William Doran & Son, Belmont	8 00
Second, William Doran & Son, Sharpless	6 00
Third, Marshall F. Ewell, Marshall	5 00
Fourth, Mrs. J. Warren Clark, Bubach	4 00
Two quarts of Belmont, Warren Heustis & Son	4 00
Second, George V. Fletcher	3 00
Third, George F. Wheeler	2 00
Bubach, Oliver R. Robbins	4 00
Second, J. C. Haskell	3 00
Third, William C. Winter	2 00
Champion, George F. Wheeler	4 00
Second, George V. Fletcher	3 00
Charles Downing, William C. Winter	4 00
Second, William Doran & Son	3 00
Third, George F. Wheeler	2 00
Crescent, Isaac E. Coburn	4 00
Second, William C. Winter	3 00
Third, George F. Wheeler	2 00
Cumberland, William C. Winter	4 00
Second, Wilfred Wheeler	3 00
Third, George F. Wheeler	2 00
Jesse, George V. Fletcher	4 00
Second, Isaac E. Coburn	3 00
Third, William C. Winter	2 00
Leader, George V. Fletcher	4 00
Second, Isaac E. Coburn	3 00
Third, George F. Wheeler	2 00
Marshall, Sumner Coolidge	4 00
Second, Marshall F. Ewell	3 00

May King, William C. Winter	$4 00
Miner's Prolific, George F. Wheeler	4 00
Second, M. S. Heath	3 00
Sharpless, William Doran & Son	4 00
Wilder, the Second prize to William C. Winter	3 00
Any other variety, Bela F. Lincoln, Hersey Columbia	4 00
Second, Isaac E. Coburn, Haverland	3 00
Third, Isaac E. Coburn, Parker Earle	2 00
Collection of not less than six varieties, one quart of each, George V. Fletcher	8 00
Second, George F. Wheeler	6 00
One quart of any new variety, not previously exhibited. William G. Prescott, Seedling	3 00
Second, William C. Strong, Mary	2 00
CHERRIES.—Two quarts of any variety, George V. Fletcher	4 00
Second, Oliver R. Robbins	3 00
Third, Edwin Hastings	2 00
FOREIGN GRAPES.—Two bunches of any variety, Elisha S. Converse Black Hamburg	6 00
Second, Winter Brothers, Black Hamburg	4 00

JUNE 30.

STRAWBERRIES.—One quart of any variety, Marshall F. Ewell, Marshall	3 00
Second, Warren Heustis & Son, Belmont	2 00
Third, George V. Fletcher, Jesse	1 00
CHERRIES.—Black Eagle, Samuel G. Damon	3 00
Black Tartarian, E. W. Wood	3 00
Second, Leverett M. Chase	2 00
Coe's Transparent, John L. Bird	3 00
Downer's Late, Charles S. Smith	3 00
Second, Marshall W. Chadbourne	2 00
Third, Charles N. Brackett	1 00
Any other variety, Charles S. Smith, Hyde's Seedling	3 00
Second, Charles N. Brackett, Merriam	2 00
Third, Marshall W. Chadbourne, Yellow Spanish	1 00

Gratuities:—

William Doran & Son, Strawberries and Raspberries	1 00
William C. Strong, Strawberries.	1 00

JULY 7.

CHERRIES.—Two quarts of any variety, Charles S. Smith, Hyde's Seedling	3 00
Second, Leverett M. Chase, Black Tartarian	2 00
Third, E. W. Wood, Downer's Late	1 00

RASPBERRIES.—Two quarts of any variety, Josiah W. Talbot, Talbot's Prolific $3 00
Second, William Doran & Son. Hornet 2 00
Third, Charles E. Grant, Cuthbert 1 00
CURRANTS.—Two quarts of any red variety, Sumner Coolidge, Fay's 4 00
Second, William Doran & Son, Versaillaise 3 00
Third, Elisha S. Converse, Fay's 2 00
Two quarts of any white variety, Elisha S. Converse, White Grape 3 00
Second, Benjamin G. Smith, Dana's White 2 00

JULY 14.

RASPBERRIES.—Collection of not less than four varieties, two quarts of each, William Doran & Son 4 00
Two quarts of any variety, Mrs. E. J. Cutter, Cuthbert . . 3 00
Second, Charles E. Grant, Cuthbert 2 00
CURRANTS.—One quart of Versaillaise, William Doran & Son . 2 00
Second, Benjamin G. Smith 1 00
One quart of any other Red variety, Sumner Coolidge . . . 2 00
Second, Benjamin G. Smith 1 00
One quart of any White variety, Elisha S. Converse . . . 2 00
Second, Benjamin G. Smith 1 00
GOOSEBERRIES.—Two quarts of any Native variety, Amos Bates, Seedling 3 00
Second, Joseph S. Chase, Triumph 2 00
Third, William O'Connell 1 00

Gratuities:—

William C. Winter, Peaches 1 00
Marshall W. Chadbourne, Collection 1 00

JULY 21.

RASPBERRIES.—Two quarts of any variety, Mrs. E. J. Cutter, Cuthbert 3 00
Second, William C. Strong, Cuthbert 2 00
Third, Charles E. Grant, Cuthbert 1 00
CURRANTS.—One quart of any Red variety, William Doran & Son, Versaillaise 3 00
Second, Benjamin G. Smith, Versaillaise 2 00
Third, Sumner Coolidge, Fay's 1 00
One quart of any White variety, Samuel J. Trepess . . . 2 00
Second, Elisha S. Converse 1 00
BLACKBERRIES.—Two quarts of any variety, Sumner Coolidge, Dorchester 3 00
Second, Marshall W. Chadbourne, Dorchester 2 00
Third, Walter G. Kendall, Lucretia 1 00
GOOSEBERRIES.—Two quarts of any foreign variety, Benjamin G. Smith, Eslander Bey 3 00
Second, W. N. Craig, Industry 2 00
Third, Benjamin G. Smith, Whitesmith 1 00

Gratuities:—

M. L. Burbank, Blueberries	$1 00
Benjamin G. Smith, Collection of Gooseberries	1 00
John L. Gardner, " " "	1 00
Winter Brothers, Foreign Grapes	1 00

JULY 28.

BLACKBERRIES.—Two quarts of any variety, Sumner Coolidge	3 00
Second, Nathaniel T. Kidder	2 00
Third, Marshall W. Chadbourne	1 00
APPLES.—Tetofsky, P. G. Hanson	3 00
Second, Warren Fenno	2 00
PEARS.— Summer Doyenne, Elisha S. Converse	3 00
Second, Benjamin G. Smith	2 00
Third, Warren Fenno	1 00
Any other variety, A. T. Brown, Giffard	3 00
Second, Warren Fenno, "	2 00
Third, John L. Bird, "	1 00
PEACHES—Any variety, William G. Prescott, Early Canada	3 00
Second, J. W. Howard, Hale's Early	2 00

Gratuities:—

Elisha W. Converse, Foreign Grapes	3 00
Benjamin G. Smith, Collection	2 00
Mrs. E. J. Cutter, "	1 00

AUGUST 4.

APPLES.—Red Astrachan, William T. Hall	3 00
Second, Samuel G. Damon	2 00
Third, John L. Bird	1 00
Sweet Bough, George V. Fletcher	3 00
Second, Charles B. Travis	2 00
Third, Warren Heustis & Son	1 00
Any other variety, P. G. Hanson, Williams	3 00
Second, P. G. Hanson, Transparent	2 00
Third, Samuel Hartwell, Williams	1 00
PEARS.—Giffard, A. T. Brown	3 00
Second, Mrs. Mary Langmaid	2 00
Third, Samuel G. Damon	1 00
Any other variety, Sumner Coolidge, Clapp's Favorite	3 00
Second, Samuel G. Damon, " "	2 00
Third, A. T. Brown, " "	1 00
BLACKBERRIES.—Two quarts of any variety, Sumner Coolidge	3 00
Second, Nathaniel T. Kidder	2 00
Third, Marshall W. Chadbourne	1 00
PEACHES.—Any variety, Mrs. E. J. Cutter, Page's Seedling	3 00
Second, Nathaniel T. Kidder, Alexander	2 00
Third, William H. Slocum, Page's Seedling	1 00

August 11.

Apples.—Oldenburg, Samuel Hartwell	$3 00
Second, John L. Bird	2 00
Third, William T. Hall	1 00
Any other variety, P. G. Hanson, Williams	3 00
Second, Samuel Hartwell, Summer Pippin	2 00
Third, Samuel Hartwell, Williams	1 00
Pears.—Clapp's Favorite, Sumner Coolidge	3 00
Second, Samuel G. Damon	2 00
Third, A. T. Brown	1 00
Manning's Elizabeth, Mrs. Mary Langmaid	2 00
Second, Frank Ware	1 00
Any other variety, Edward B. Wilder, Brandywine	2 00
Second, Charles N. Brackett, Brandywine	1 00
Apricots.—Any variety, Benjamin G. Smith	3 00
Peaches.—Twelve specimens, of out-door culture, of any variety, Sumner Coolidge	3 00
Second, Mrs. E. J. Cutter	2 00
Gratuities:—	
Benjamin G. Smith, Collection	1 00
Marshall W. Chadbourne, Collection	1 00

August 18.

Apples.—Chenango, Charles F. Curtis	3 00
Second, Samuel Hartwell	2 00
Third, P. G. Hanson	1 00
Williams, P. G. Hanson	3 00
Second, J. C. Stowe	2 00
Third, Charles F. Curtis	1 00
Any other variety, George V. Fletcher, Sweet Bough	3 00
Second, George C. Rice, Somerset	2 00
Third, Samuel Hartwell, Summer Pippin	1 00
Pears.—Rostiezer, Willard P. Plimpton	3 00
Second, Marshall W. Chadbourne	2 00
Third, Elisha S. Converse	1 00
Tyson, John L. Bird	3 00
Second, Charles E. Swain	2 00
Third, Leverett M. Chase	1 00
Any other variety, A. T. Brown, Bartlett	3 00
Second, Elmer Chipman, Boussock	2 00
Third, Samuel G. Damon, Bartlett	1 00
Peaches.—Any variety, Sumner Coolidge, Rivers	3 00
Second, Sumner Coolidge, Allen	2 00
Plums.—Any variety, Joseph S. Chase, Abundance	3 00
Second, George V. Fletcher, Bradshaw	2 00
Third, Rufus T. Tobey "	1 00
Native Grapes.—Six bunches of any variety, William H. Hunt, Rockwood	3 00

AUGUST 25.

APPLES.— Foundling, Charles M. Handley	$3 00
Second, A. M. Knowlton	2 00
Third, Asa Clement	1 00
Gravenstein, William Milman	3 00
Second, Samuel G. Damon	2 00
Third, Sumner Coolidge	1 00
Maiden's Blush, William G. Kendall	3 00
Second, E. R. Cook	2 00
Third, Charles F. Curtis	1 00
Porter, Sumner Coolidge	3 00
Second, Samuel Hartwell	2 00
Third, Samuel G. Damon	1 00
Summer Pippin, Samuel Hartwell	3 00
Second, Warren Fenno	2 00
Third, Jesse F. Wheeler	1 00
Any other variety, E. R. Cook, Twenty Ounce	3 00
Second, Samuel Hartwell, Thompson	2 00
Third, Charles M. Handley	1 00
PEARS.— Andrews, Elisha S. Converse	3 00
Second, Mrs. Mary Langmaid	2 00
Third J. C. Stowe	1 00
Bartlett, A. T. Brown	3 00
Second, Mrs. E. J. Curtis	2 00
Third, Sumner Coolidge	1 00
Boussock, Elmer Chipman	3 00
Second, Leverett M. Chase	2 00
Third, Mrs. E. J. Curtis	1 00
Any other variety, A. T. Brown, Flemish Beauty	3 00
Second, A. T. Brown, De Tongres	2 00
Third, George V. Fletcher, Clapp's Favorite	1 00
PEACHES.— Single dish of any variety, the Second prize to Mrs. Nathan D. Harrington	2 00
PLUMS.— Bradshaw, Leverett M. Chase	3 00
Second, William H. Hunt	2 00
Third, George V. Fletcher	1 00
Imperial Gage, Mrs. Mary Langmaid	3 00
Second, E. R. Cook	2 00
Third, Benjamin G. Smith	1 00
Jefferson, E. R. Cook	3 00
Second, Samuel Hartwell	2 00
Third, William O'Connell	1 00
Lombard, Charles E. Grant	3 00
Second, Rev. Calvin Terry	2 00
Third, Charles S. Smith	1 00
Washington, M. L. Whitney	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Charles E. Grant	1 00

Any other variety, C. F. Holt, McLaughlin	$3 00
Second, Mrs. Mary T. Goddard, Victoria	2 00
Third, Charles E. Grant, Yellow Gage	1 00
Native Grapes.— Six bunches of any variety, Samuel Hartwell, Moore's Early	3 00
Second, Benjamin G. Smith, Moore's Early	2 00
Third, William H. Hunt, Rockwood	1 00

September 5.

Gratuities:—

Mrs. J. W. Clark, Collection of Foreign Grapes	20 00
Sumner Coolidge, Crawford's Early Peaches	1 00
Mrs. Fannie C. Gay, " " "	1 00
C. M. Wood, " " "	1 00

September 15.

Apples.— Foundling, George W. Clement	3 00
Second, A. M. Knowlton	2 00
Third, Charles M. Handley	1 00
Garden Royal, J. C. McNeil	3 00
Second, Charles M. Handley	2 00
Third, A. M. Knowlton	1 00
Gravenstein, Samuel Hartwell	3 00
Second, William T. Hall	2 00
Third, William Milman	1 00
Maiden's Blush, Walter G. Kendall	3 00
Second, E. R. Cook	2 00
Third, H. R. Kinney	1 00
Porter, Sumner Coolidge	3 00
Second, Charles M. Handley	2 00
Third, Samuel G. Damon	1 00
Pumpkin Sweet, Samuel Hartwell	3 00
Second, George W. Stevens	2 00
Third, Benjamin G. Smith	1 00
Any other variety, Charles M. Handley, Holden	3 00
Second, Charles M. Handley, Wealthy	2 00
Third, Edward E. Allen, Washington Strawberry	1 00
Crab Apples.—Twenty-four specimens of Transcendent, William Milman	2 00
Second, F. P. Partridge	1 00
Any other variety, Marshall W. Chadbourne	2 00
Second, P. G. Hanson	1 00
Pears.— Bartlett, Samuel G. Damon	3 00
Second, Mrs. Nathan D. Harrington	2 00
Third, Samuel Hartwell	1 00
Belle Lucrative, Charles E. Richardson	3 00
Second, Mrs. Mary Langmaid	2 00
Third, Clifford R. Weld	1 00

Boussock, Charles E. Swain	$3 00
Second, Mrs. Mary Langmaid	2 00
Third, A. M. Leavitt	1 00
Hardy, Miss Mary E. Walker	3 00
Second, William S. Janvrin	2 00
Third, William Milman	1 00
Paradise of Autumn, William H. Hunt	3 00
Second, William Milman	2 00
Third, Warren Fenno	1 00
Souvenir du Congrès, A. T. Brown	3 00
Second, Walter G. Kendall	2 00
Third, Marshall W. Chadbourne	1 00
Any other variety, A. T. Brown, Bosc	3 00
Second, Charles E. Swain, Seckel	2 00
Third, A. T. Brown, Flemish Beauty	1 00
Peaches.—Coolidge's Favorite, Sumner Coolidge	3 00
Crawford's Early, John L. Bird	3 00
Foster, Sumner Coolidge	3 00
Second, Mrs. Mary Langmaid	2 00
Oldmixon, Sumner Coolidge	3 00
Second, Charles E. Swain	2 00
Stump the World, Mrs. Mary T. Goddard	3 00
Second, Leverett M. Chase	2 00
Third, Elisha S. Converse	1 00
Any other variety, J. H. Hale, Crosby	3 00
Second, Warren Heustis & Son, Seedling	2 00
Third, W. D. Hinds, Crosby	1 00
Peaches.—Orchard House Culture, Charles E. Grant, Globe	3 00
Nectarines.—Any variety, C. C. Donnell	2 00
Plums.— Bradshaw, Leverett M. Chase	3 00
Second, George V. Fletcher	2 00
Third, Mrs. Mary T. Goddard	1 00
Imperial Gage, C. E. Weld	3 00
Second, George M. Marshall	2 00
Third, Charles E. Grant	1 00
Jefferson, C. E. Weld	3 00
Lombard, George V. Fletcher	3 00
Second, E. R. Cook	2 00
Third, Charles E. Grant	1 00
Any other variety, George V. Fletcher, Gen. Hand	3 00
Second, George V. Fletcher, Coe's Golden Drop	2 00
Third, Mrs. Mary T. Goddard, Pond's Seedling	1 00
Native Grapes — Cottage, Benjamin G. Smith	3 00
Second, William H. Hunt	2 00
Third, Samuel Hartwell	1 00
Eumelan, George B. Andrews	3 00
Second, Benjamin G. Smith	2 00

Massasoit, Benjamin G. Smith	$3 00
Second, F. J. Kinney	2 00
Moore's Early, Samuel Hartwell	3 00
Second, Benjamin G. Smith	2 00
Third, F. J. Kinney	1 00
Any other variety, Benjamin G. Smith, Worden	3 00
Second, Samuel Hartwell, Worden	2 00
Third, Luther Eames, Seedling	1 00
Any variety, from girdled vines, F. J. Kinney, Worden	3 00
Second, F. J. Kinney, Concord	2 00

Gratuity:—

Robert Manning, Brown Turkey Figs	1 00

ANNUAL FRUIT AND VEGETABLE EXHIBITION.

October 3 and 4.

Special Prizes.

Samuel Appleton Fund.

Apples.—Baldwin, Timothy L. Fisher	5 00
Hubbardston, Charles M. Handley	5 00
Pears.—Bosc, Thomas M. Davis	5 00
Sheldon, Samuel G. Damon	5 00

Benjamin V. French Fund.

Apples.—Gravenstein, Samuel Hartwell	5 00
Rhode Island Greening, Nathaniel T. Kidder	5 00

Marshall P. Wilder Fund.

Pears.— Anjou, Mrs. Klaus	4 00
Second, A. T. Brown	3 00
Third, Samuel G. Damon	2 00
Fourth, Mrs. Mary Langmaid	1 00
Bartlett, Samuel Hartwell	4 00
Second, George V. Fletcher	3 00
Third, A. T. Brown	2 00
Fourth, Samuel G. Damon	1 00
Grapes.— Concord, George B. Andrews	3 00
Second, Samuel G. Damon	2 00
Third, F. J. Kinney,	1 00
Worden, George B. Andrews	3 00
Second, F. J. Kinney	2 00
Third, Samuel Hartwell	1 00

Theodore Lyman Fund.

FOREIGN GRAPES.— Best ripened and heaviest bunch of any Black variety, not less than six pounds, Mrs. J. Warren Clark . $10 00

Special Prize offered by David Allan.

For the best finished and bloomed bunch of Foreign Grapes, over one pound in weight, any Black variety, Mrs. J. Warren Clark 5 00

Special Prizes offered by the Society.

PEARS.— Anjou, Samuel G. Damon 5 00
Seckel, Charles E. Swain 5 00
PEACHES.—Any variety, W. D. Hinds 5 00
NATIVE GRAPES.— Any variety, George B. Andrews . . . 5 00

REGULAR PRIZES.

Theodore Lyman Fund.

APPLES.— Baldwin, Sumner Coolidge 4 00
Second, Thomas L. Perkins 3 00
Third, George C. Rice 2 00
Dutch Codlin, Warren Fenno 2 00
Second, J. C. Stowe 1 00
Holden, Charles M. Handley 3 00
Second, Samuel Hartwell 2 00
Third, O. B. Hadwen 1 00
Fameuse, Sumner Coolidge 3 00
Second, Charles F. Curtis 2 00
Third, David L. Fisk 1 00
Fletcher Russet, Charles F. Curtis 3 00
Second, William H. Teele 2 00
Foundling, Charles M. Handley 4 00
Second, A. M. Knowlton 3 00
Third, G. W. Clement 2 00
Gloria Mundi, Samuel Hartwell 3 00
Second, Mrs. J. Warren Clark 2 00
Third, E. R. Cook 1 00
Golden Russet, Francis Brown Hayes 3 00
Gravenstein, Varnum Frost 4 00
Second, Louis Kendall 3 00
Third, Samuel Hartwell 2 00
Hubbardston, P. G. Hanson 4 00
Second, Charles M. Handley 3 00
Third, George W. Stevens 2 00
Hunt Russet, Samuel Hartwell 3 00
Second, William H. Teele 2 00
Third, William H. Hunt 1 00
Lady's Sweet, David L. Fisk 2 00
Second, A. M. Knowlton 1 00

Mackintosh, Samuel Hartwell	$3 00
Second, George C. Rice	2 00
Third, Charles M. Handley	1 00
Maiden's Blush, Walter G. Kendall	2 00
Second, Louis J. Kendall	1 00
Mother, George C. Rice	3 00
Second, O. B. Hadwen	2 00
Third, William H. Teele	1 00
Northern Spy, Samuel Hartwell	3 00
Second, William T. Hall	2 00
Third, Charles M. Handley	1 00
Porter, Charles M. Handley	3 00
Second, Samuel G. Damon	2 00
Third, George V. Fletcher	1 00
Pound Sweet, Samuel Hartwell	3 00
Second, George C. Rice	2 00
Third, George V. Fletcher	1 00
Pumpkin Sweet, Samuel G. Damon	2 00
Second, George W. Stevens	1 00
Rhode Island Greening, Willard P. Plimpton	4 00
Second, George C. Rice	3 00
Third, Louis J. Kendall	2 00
Roxbury Russet, Nathaniel T. Kidder	4 00
Second, David L. Fisk	3 00
Third, Samuel Hartwell	2 00
Sutton, Louis J. Kendall	3 00
Second, David L. Fisk	2 00
Third, Samuel Hartwell	1 00
Tolman Sweet, George C. Rice	3 00
Second, Artemas Frost	2 00
Third, Willard P. Plimpton	1 00
Tompkins King, Louis J. Kendall	3 00
Second, George C. Rice	2 00
Third, Samuel Hartwell	1 00
Palmer, O. B. Hadwen	3 00
Second, George C. Rice	2 00
Third, George Cruickshanks	1 00
Washington Strawberry, J. C. Stowe	2 00
Second, George C. Rice	1 00
Wealthy, Charles M. Handley	3 00
Second, William O'Connell	2 00
Third, George C. Rice	1 00
Any other variety, William Everett, Jacobs Sweet	3 00
Second, George C. Rice	2 00
Third, F. Tracy Hubbard	1 00
Crab Apples.— Hyslop, Horace Partridge	2 00
Second, Marshall W. Chadbourne	1 00

Society's Prizes.

Pears.— Angouleme, A. T. Brown	$4 00
Second, Samuel G. Damon	3 00
Third, William Milman	2 00
Fourth, Mrs. G. A. Curtis	1 00
Bosc, Sumner Coolidge	4 00
Second, Elisha S. Converse	3 00
Third, Charles N. Brackett	2 00
Fourth, Mrs. Mary Langmaid	1 00
Clairgeau, William T. Hall	3 00
Second, William S. Janvrin	2 00
Third, Mrs. Mary Langmaid	1 00
Comice, A. T. Brown	3 00
Second, Charles N. Brackett	2 00
Third, Warren Fenno	1 00
Dana's Hovey, Charles E. Swain	4 00
Second, Marshall W. Chadbourne	3 00
Third, Willard P. Plimpton	2 00
Fourth, George V. Fletcher	1 00
Diel, Charles E. Swain	3 00
Second, A. T. Brown	2 00
Third, Samuel G. Damon	1 00
Fulton, Elisha S. Converse	3 00
Second, S. F. & F. L. Weston	2 00
Third, Charles F. Curtis	1 00
Hardy, Aaron S. McIntosh	3 00
Second, Elisha S. Converse	2 00
Third, Miss C. D. Thacher	1 00
Howell, William H. Hunt	3 00
Second, Mrs. Mary Langmaid	2 00
Third, Mrs. George S. Harwood	1 00
Josephine of Malines, Warren Fenno	3 00
Second, John L. Bird	2 00
Third, Benjamin G. Smith	1 00
Lawrence, Mrs. Mary Langmaid	3 00
Second, William S. Janvrin	2 00
Third, Rufus T. Tobey	1 00
Louise Bonne of Jersey, Miss Curtis	3 00
Second, N. E. Shipman	2 00
Third, Charles E. Richardson	1 00
Marie Louise, Samuel G. Damon	3 00
Second, Warren Fenno	2 00
Third, Charles E. Swain	1 00
Merriam, A. T. Brown	3 00
Second, Charles E. Swain	2 00
Third, Warren S. Ewell & Son	1 00

Onondaga, Leverett M. Chase	$3 00
Second, Miss C. D. Thacher	2 00
Third, Elisha S. Converse	1 00
Seckel, Mrs. Nathan D. Harrington	4 00
Second, Mrs. Klaus	3 00
Third, William Everett	2 00
Fourth, Charles E. Swain	1 00
Sheldon, Samuel G. Damon	4 00
Second, Mrs. Nathan D. Harrington	3 00
Third, Mrs. Mary Langmaid	2 00
Fourth, Charles E. Wiggin	1 00
Souvenir du Congrès, A. T. Brown	3 00
Second, Marshall W. Chadbourne	2 00
St. Michael Archangel, Benjamin G. Smith	3 00
Second, Miss Susan Quinn	2 00
Third, Thomas M. Davis	1 00
Superfin, Samuel G. Damon	3 00
Second, William H. Hunt	2 00
Third, Leverett M. Chase	1 00
Urbaniste, Samuel G. Damon	3 00
Second, Elisha S. Converse	2 00
Third, John L. Bird	1 00
Vicar, A. T. Brown	3 00
Second, Miss Jones	2 00
Third, Charles E. Swain	1 00
Winter Nelis, Thomas M. Davis	3 00
Second, Edwin A. Hall	2 00
Third, T. M. Brown	1 00
Any other variety, Charles F. Schirmer, Mount Vernon	3 00
Second, N. E. Shipman, Flemish Beauty	2 00
Third, A. T. Brown, De Tongres	1 00
Quinces.— Orange, William H. Hunt	3 00
Second, W. D. Hinds	2 00
Third, C. J. O'Brien	1 00
Pear, E. R. Cook	3 00
Second, George V. Fletcher	2 00
Third, Benjamin G. Smith	1 00
Rea, Mrs. Mary T. Goddard	3 00
Second, Mrs. George S. Harwood	2 00
Third, George S. Curtis	1 00
Any other variety, William T. Hall	3 00
Second, Charles B. Travis	2 00
Third, Benjamin G. Smith	1 00
Peaches.— Any variety, W. D. Hinds	3 00
Second, Sumner Coolidge	2 00
Third, C. A. Kendall	1 00

Peaches, Orchard House Culture.— The Second prize to Charles E. Grant	$3 00
Plums.—Coe's Golden Drop, Charles E. Grant	2 00
Second, W. D. Hinds	1 00
Any other variety, George V. Fletcher, Golden Egg	2 00
Second, George V. Fletcher, Bradshaw	1 00
Native Grapes.—Brighton, Benjamin G. Smith	3 00
Second, Samuel Hartwell	2 00
Third, Marshall W. Chadbourne	1 00
Delaware, George B. Andrews	3 00
Second, Samuel G. Damon	2 00
Third, Samuel Hartwell	1 00
Iona, Samuel G. Damon	3 00
Second, Joseph S. Chase	2 00
Lindley, F. J. Kinney	3 00
Second, Benjamin G. Smith	2 00
Niagara, Samuel Hartwell	3 00
Second, Benjamin G. Smith	2 00
Third, Albert S. Caswell	1 00
Pocklington, Samuel Hartwell	3 00
Second, Benjamin G. Smith	2 00
Third, Samuel G. Damon	1 00
Prentiss, Benjamin G. Smith	3 00
Second, Joseph S. Chase	2 00
Wilder, Benjamin G. Smith	3 00
Second, George B. Andrews	2 00
Third, F. J. Kinney	1 00
Worden, George B. Andrews	3 00
Second, Benjamin G. Smith	2 00
Third, F. J. Kinney	1 00
Any other variety, Benjamin G. Smith, Jefferson	3 00
Second, Benjamin G. Smith, Barry	2 00
Six bunches of Concord, from girdled vines, F. J. Kinney	3 00
Foreign Grapes.— Four varieties, two bunches of each, Mrs. J. W. Clark	10 00
Second, Benjamin G. Smith	8 00
Black Hamburg, two bunches, Mrs. J. W. Clark	5 00
Muscat of Alexandria, Joseph H. White	5 00
Second, Benjamin G. Smith	4 00
Any other variety, Mrs. J. W. Clark	5 00
Cranberries.— Half-peck, L. J. Fosdick, Gloriana	3 00
Second, L. J. Fosdick, McFarlin	2 00
Third, L. J. Fosdick, Middleboro	1 00
Gratuity:—	
Sumner Coolidge, Peaches	1 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

NOVEMBER 17.

Benjamin V. French Fund.

APPLES.— Baldwin, Marshall W. Chadbourne	5 00
Hubbardston, Charles M. Handley	5 00

Society's Prizes.

APPLES.— Baldwin, C. C. Boyden	3 00
Second, George V. Fletcher	2 00
Third, Marshall W. Chadbourne	1 00
Danvers Sweet, Charles M. Handley	3 00
Second, Louis J. Kendall	2 00
Third, Littlefield Farm	1 00
Hubbardston, Charles M. Handley	3 00
Second, C. C. Shaw	2 00
Third, Samuel Hartwell	1 00
Hunt Russet, W. P. Hutchinson	3 00
Second, Samuel Hartwell	2 00
Third, William H. Hunt	1 00
Lady's Sweet, the Second prize to Mrs. J. E. Charlton.	1 00
Northern Spy, Littlefield Farm	3 00
Second, George C. Rice	2 00
Third, Charles M. Handley	1 00
Rhode Island Greening, Willard P. Plimpton	3 00
Second, Louis J. Kendall	2 00
Third, Charles M. Handley	1 00
Roxbury Russet, Littlefield Farm	3 00
Second, Nathaniel T. Kidder	2 00
Third, Louis J. Kendall	1 00
Tolman Sweet, George C. Rice	3 00
Second, Willard P. Plimpton	2 00
Third, Artemas Frost	1 00
Any other variety, George C. Rice, Yellow Bellflower	3 00
Second, Charles M. Handley, Mackintosh	2 00
Third, Louis J. Kendall, Canada Red	1 00
PEARS.— Angouleme, Samuel G. Damon	4 00
Second, A. T. Brown	3 00
Third, Varnum Frost	2 00
Fourth, Miss Curtis	1 00
Anjou, Samuel G. Damon	4 00
Second, A. T. Brown	3 00
Third, Mrs. Klaus	2 00
Fourth, Elmer Chipman	1 00

Clairgeau, William T. Hall	$3 00
Second, Samuel G. Damon	2 00
Third, Marshall W. Chadbourne	1 00
Comice, A. T. Brown	4 00
Dana's Hovey, Charles E. Swain	4 00
Second, James H. Clapp	3 00
Third, George V. Fletcher	2 00
Fourth, Marshall W. Chadbourne	1 00
Diel, Charles E. Swain	3 00
Second, A. T. Brown	2 00
Third, Samuel G. Damon	1 00
Glout Morceau, Aaron S. McIntosh	3 00
Second, Mrs. W. G. Curtis	2 00
Third, Elmer Chipman	1 00
Josephine of Malines, John L. Bird	3 00
Second, Samuel G. Damon	2 00
Third, Warren Fenno	1 00
Langelier, Mrs. A. Klaus	3 00
Second, Edward B. Wilder	2 00
Third, A. H. Lewis	1 00
Lawrence, Samuel G. Damon	3 00
Second, Miss Curtis	2 00
Third, Marshall W. Chadbourne	1 00
Vicar, A. T. Brown	3 00
Second, Mrs. S. R. Jones	2 00
Third, Edwin A. Hall	1 00
Winter Nelis, Thomas M. Davis	3 00
Second, Walter G. Kendall	2 00
Third, Clifford R. Weld	1 00
Any other variety, Samuel G. Damon, Sheldon	3 00
Second, George V. Fletcher, Bosc	2 00
Third, Samuel G. Damon, Marie Louise	1 00
FOREIGN GRAPES.— Two bunches of any variety, Elisha S. Converse, Gros Colman	5 00
Second, Elisha S. Converse, Alicante	4 00

Gratuities:—

Samuel G. Damon, Ten varieties Pears	2 00
L. J. Fosdick, Cranberries	1 00
Charles W. Adams, Plymouth, Florida, Lemons	1 00

REPORT

OF THE

COMMITTEE ON VEGETABLES,

FOR THE YEAR 1894.

By CHARLES N. BRACKETT, Chairman.

In presenting their report for the year now closing, your Committee take great pleasure in being able to congratulate the Society on the commendable exhibits which this department has been able to make, notwithstanding the extremely hot, dry summer, and other drawbacks discouraging to the cultivator. The unprecedented drought, with the mercury standing for days together in the nineties, told severely upon growing crops, which in some instances were totally ruined from the absence of the much needed rain.

The experience of the year teaches the cultivator the importance of securing every possible condition of success in the growing of his crops. The importance of water to growing plants, and its influence upon them may readily be conceived, when it is known to form upwards of one-half of all green vegetable matter, and to serve as a means of conveyance for all the nutritive elements required for their sustenance. With an unlimited supply of water at command, and facilities for its proper distribution among his crops, the farmer is seldom heard to complain of drought, neither is he worried about excessive cost, if his land is well and properly

drained. He becomes in a degree independent of extremes; to him all seasons are good, the adverse season often proving the most profitable because of the enhanced price he is able to obtain for his crops.

In the field or garden it is possible by draining and deep cultivation, to modify the injurious effects resulting either from excess or deficiency of water. By its withdrawal at certain seasons and freer application at others, we can induce different developments, and hasten or retard the maturity of crops at will.

Seeing that water is not only a most important agent in vegetation, but one more under subjection than any other, it is evident that by its skilful application in times of drought, we can in a great measure control and regulate the growth of plants. Light, heat, and air, it is true, are also essential agents, and their coöperation is indispensable; but over the first of these we have no control, and the other two are under subjection only in artificial atmospheres under glass.

In seasons like the past the possession of this controlling influence given by the command of an abundant water supply is practically of great importance to the market gardener, some of the more enterprising of whom are so well aware of this fact, that they have provided themselves with it at considerable expense; and are satisfied that they are well paid for the trouble.

We noticed among our contributors at the weekly exhibitions, a few who have availed themselves of this agent, who were thereby enabled to place on exhibition during the dry season, specimens of different varieties of vegetables, which for size, beauty, and freshness of appearance, could not be surpassed in the most favorable season. It is hardly necessary to add that they also captured most of the first prizes.

Although the past year was so unfavorable, the displays seen on our tables have been good, doing even more credit to the skilful grower than in seasons much more propitious for the production of good vegetables. It is when adverse influences are encountered, that the real merits of the skilful cultivator are seen.

The show of forced vegetables has been an improvement over the previous year, both as regards the number of competitors and the quality of exhibits. The raising of vegetables under glass appears to be, year by year, becoming more and more an object of interest and profit to the market gardener. New contributors

are constantly presenting themselves for this class of prizes, and by the displays in this branch of horticulture, the exhibitions during the earlier portion of the year are rendered interesting and attractive. Competition for the prizes offered by the Society has been as active as usual the past year, and the exhibitions during the season have been well sustained.

Our first exhibition of Peas was on the 16th of June, when Walter Russell showed Maud S., and Cephas H. Brackett Alaska peas. This crop, except in a few instances, where water was at command and freely used, was badly affected by the drought, and some of the specimens shown were not equal to those of more favorable seasons, on this account. The leading varieties, besides those already named, have been American Wonder, Advancer, Stratagem, Heroine, and Champion of England.

Tomatoes of open culture were shown for the first time July 14, Varnum Frost taking the first prize with Comrade, and Samuel J. Trepess the second, with May's Favorite. The Comrade is fast taking the place of the Emery with market gardeners about Boston, as they find it more uniform in size, a better cropper, and equally early. May's Favorite, exhibited at the same time, received the second prize, but at the following show, July 21, was first. This variety was favorably noticed in our report of last year, and a somewhat extended and more general cultivation of it, the past season, seems to justify the favorable opinion formed in regard to it at that time. It forces well, and was shown by several contributors during the winter. At the Annual Exhibition Hon. Aaron Low was the largest exhibitor, showing twenty different varieties, some of which were placed on our tables for the first time. On the long-established and well-known favorite sorts no remarks at this time are necessary. Upwards of fifty dishes were shown by different contributors at this exhibition.

From the opening, or May Show, the exhibits increased in excellence from week to week until the closing one, September 15, which was decidedly the largest and best of the season. Nearly every prize was competed for and taken. No claimants appeared for any of the prizes for Melons, of any variety, until this last mentioned show, when the premiums in all the different classes were awarded. The contributors of some of the finest specimens were E. C. Lewis, Nathaniel T. Kidder, Hon. Aaron Low, Samuel Hartwell, Charles E. Grant, and John Parker.

The show of Potatoes at both the weekly and Annual exhibitions was better than, under the circumstances, we were led to expect. The effect of the drought was most disastrous to this crop, reducing the yield, as it is estimated, nearly one-half in some localities. The dry weather was no doubt favorable to the quality and soundness of the crop, and to its freedom from disease. Notwithstanding the injurious effects from this cause, many fine specimens were, from time to time, to be seen on our tables, both at the weekly and Annual shows. The first exhibition of the season was made June 30, by Hon. Joseph S. Fay, who took all the prizes, with three well-grown varieties, Early Rose, Savoy, and Hebron. At the Annual Exhibition, the first prize for the best four varieties was awarded to Isaac E. Coburn.

The Special prizes for Cauliflowers at the Annual Exhibition were awarded, first, to William H. Teele, and, second, to A. M. Knowlton.

Of the Special Prizes for Celery, Warren Heustis & Son received the first, and Wyman Brothers the second. In both instances the variety was Paris Golden, which appears to have entirely displaced the old favorite, Boston Market, not a single specimen of which was to be seen on exhibition at any of the shows during the season.

A new variety of Sweet Corn was shown August 18, by P. G. Hanson, under the name of Quincy Market, which, in the opinion of the Committee, appeared to possess points of superiority that further trial will determine. We regard it, however, as a very promising variety, and worthy of the special attention of market gardeners. With this exception, no new variety of vegetables has been shown worthy of special notice.

The shows of the various root crops and other vegetables during the season have been about the same as usual, both in quantity and quality, and seem to call for no special mention.

Some additions and alterations have been made in the Schedule of Prizes for the coming year, to which the attention of exhibitors is called.

We would also call their attention to Rule 4 of the Special Rules of the Vegetable Committee. Exhibits which would otherwise have been entitled to a first prize, were disqualified in several instances by non-compliance with this rule. No number appearing on the card, the Committee were compelled under this rule to pass over them.

The amount appropriated for Vegetables for 1894 was	$1,100 00
The amount awarded in prizes and gratuities	1,094 00
Leaving an unexpended balance of . . .	$6 00

Annexed is a list of the Prizes and Gratuities awarded during the year.

All of which is respectfully submitted,

For the Committee,

C. N. Brackett,

Chairman.

PRIZES AND GRATUITIES AWARDED FOR VEGETABLES.

January 6.

Gratuity:—

H. R. Kinney, Collection $1 00

January 13.

Radishes.—Four bunches of any variety, John L. Bird. . . 3 00
Cucumbers.—Pair of any variety, John L. Gardner . . . 3 00
Cauliflowers.— Four specimens, Nathaniel T. Kidder . . . 3 00
Lettuce.— Four heads of Tennisball, H. R. Kinney . . . 3 00
Second, John L. Bird 2 00
Parsley.—Two quarts, W. N. Craig 3 00
Second, John L. Gardner 2 00
Third, H. R. Kinney 1 00
Mushrooms.— Twenty-four specimens, Isaac E. Coburn . . 3 00
Second, William Stobbart 2 00
Third, Elisha S. Converse 1 00
Tomatoes.— Twelve specimens, Elisha S. Converse, May's Favorite 3 00
Second, W. N. Craig 2 00
Third, Elisha S. Converse 1 00

Gratuities :—

Warren Heustis & Son, Brussels Sprouts 1 00
Nathaniel T. Kidder, " " 1 00
John L. Gardner, " " 1 00

February 3.

Radishes.— Four bunches of any variety, John L. Bird . . 3 00
Dandelions.— Peck, Warren Heustis & Son 3 00
Lettuce.—Four heads of Tennisball, John L. Bird . . . 3 00
Mushrooms.— Twenty-four specimens, Isaac E. Coburn . . 3 00
Second, William Stobbart 2 00
Third, Elisha S. Converse 1 00
Rhubarb.— Twelve stalks, Francis Brown Hayes 3 00
Tomatoes.— Twelve specimens, Elisha S. Converse, May's Favorite 3 00
Second, Elisha S. Converse, Lorillard 2 00
Third, Winter Brothers 1 00

Gratuities :—

Warren Heustis & Son, Celery and Parsley 2 00
Calvin Terry, Onions 1 00
John L. Gardner, Brussels Sprouts 1 00

FEBRUARY 17.

Gratuities : —

Francis Brown Hayes, Rhubarb	$1 00
William Miller, Mushrooms	1 00

MARCH 3.

Gratuities : —

Warren W. Rawson, Lettuce and Radishes	3 00
Warren Heustis & Son, Dandelions	1 00
Francis Brown Hayes, Collection	2 00

MARCH 24.

Gratuity:—

Francis Brown Hayes, String Beans	1 00

SPRING EXHIBITION.

MARCH 28, 29, AND 30.

William J. Walker Fund.

RADISHES.— Four bunches of Turnip Rooted, H. R. Kinney	3 00
Second, Warren Heustis & Son	2 00
Third, George F. Stone	1 00
Four bunches of Long Scarlet, H. R. Kinney	3 00
Second, Warren Heustis & Son	2 00
Third, John L. Bird	1 00
DANDELIONS.— Warren Heustis & Son	3 00
LETTUCE.— Four heads of Tennisball, John L. Bird	3 00
Second, H. R. Kinney	2 00
PARSLEY.— Two quarts, John L. Gardner	2 00
Second, W. N. Craig	1 00
RHUBARB.— Twelve stalks, George Sanderson	3 00
Second, C. E. Sanderson	2 00
Third, Cephas H. Brackett	1 00
TOMATOES.— Twelve specimens, W. N. Craig	3 00
Second, Winter Brothers, Nicholson's Hybrid	2 00
Third, Winter Brothers, Chemin	1 00

Gratuities : —

George M. Anderson, Mushrooms	1 00
Francis Brown Hayes, Collection	2 00
Ettore Tassinari, "	2 00
Warren Heustis & Son, "	1 00

APRIL 7.

MUSHROOMS.— Twenty-four specimens, Isaac E. Coburn	3 00
Second, George M. Anderson	2 00

Gratuity:—

Warren Heustis & Son, Radishes and Dandelions $1 00

April 14.

Gratuities:—

William Nicholson, Tomatoes 1 00
Varnum Frost, White Spine Cucumbers 1 00

April 21.

Gratuities : —

Francis Brown Hayes, Cucumbers 2 00
Varnum Frost, " 1 00
Walter Russell, Collection 2 00

April 28.

Gratuities : —

Walter Russell, Three varieties of Radishes 2 00
P. G. Hanson, Rhubarb 1 00
Mrs. Mary T. Goddard, Collection 2 00
Varnum Frost, " 2 00
Warren Heustis & Son, " 1 00

MAY EXHIBITION.

May 5.

William J. Walker Fund.

Asparagus.— Four bunches, Varnum Frost 3 00
Second, William H. Hunt 2 00
Third, Charles E. Grant 1 00
Cucumbers.— Pair, Varnum Frost 3 00
Second, John L. Gardner 2 00
Third, Francis Brown Hayes 1 00
Spinach.—Peck, John L. Gardner 3 00
Second, Warren Heustis & Son 2 00
Dandelions.—Peck, Warren Heustis & Son 2 00
Second, Varnum Frost 1 00
Lettuce.— Four heads, George F. Stone 3 00
Second, Walter Russell 2 00
Third, John L. Gardner 1 00
Rhubarb.— Twelve stalks, Varnum Frost 3 00
Second, P. G. Hanson 2 00
Third, Warren Heustis & Son 1 00

Gratuities : —

Mrs. Mary T. Goddard, Cauliflowers	$2 00
William Nicholson, Tomatoes	2 00
Francis Brown Hayes, Collection	3 00
W. N. Craig "	2 00
Walter Russell, "	2 00

May 12.

Gratuities : —

Warren Heustis & Son, Collection	2 00
W. N. Craig, Three varieties of Tomatoes	2 00
Charles E. Grant, Asparagus	1 00
J. Fuller, "	1 00

May 19.

Gratuities : —

Hon. George Heywood, Asparagus	1 00
William H. Hunt, "	1 00
Francis Brown Hayes, Collection	3 00
Warren Heustis & Son, "	2 00

May 26.

Gratuities : —

Charles E. Grant, Asparagus	1 00
William H. Hunt, "	1 00
John L. Gardner, Lettuce	1 00
Warren Heustis & Son, Collection	3 00
W. N. Craig, "	3 00
Francis Brown Hayes, "	2 00

June 2.

Gratuities : —

Varnum Frost, Collection	3 00
Warren Heustis & Son, Collection	2 00
Walter Russell, "	2 00

RHODODENDRON SHOW.

June 6 and 7.

Theodore Lyman Fund.

Beets.— Twelve, of any variety, Mrs. Mary T. Goddard	3 00
Carrots.— Twelve Short Scarlet, Warren Heustis & Son	3 00
Second, Warren Heustis & Son	2 00
Third, Mrs. Mary T. Goddard	1 00

Radishes.— Four bunches of Turnip Rooted, Warren Heustis & Son	$3 00
Second, Walter Russell	2 00
Four bunches of Long Scarlet, Warren Heustis & Son	3 00
Asparagus.— Four bunches, P. G. Hanson	3 00
Second, Leonard W. Weston	2 00
Third, William H. Hunt	1 00
Cucumbers.— Pair, Warren Heustis & Son	3 00
Second, W. N. Craig	2 00
Lettuce.—Four heads, Hon. Joseph S. Fay, Deacon	3 00
Second, Hon. Joseph S. Fay, Tennisball	2 00
Third, Hon. Joseph S. Fay, All Seasons	1 00
Rhubarb.—Twelve stalks, Samuel J. Trepess	3 00
Second, Francis Brown Hayes	2 00
Third, Marshall W. Chadbourne	1 00
Tomatoes.— Twelve, Moses T. Stevens, May's Favorite	3 00
Second, William Nicholson, Nicholson's Hybrid	2 00
Third, W. N. Craig, Nicholson's Hybrid	1 00

Gratuities : —

P. G. Hanson, Asparagus	1 00
Charles E. Grant, "	1 00
Hon. Joseph S. Fay, Lettuce	1 00
Moses T. Stevens, "	1 00
Francis Brown Hayes, String Beans	1 00
Walter Russell, Onions	1 00
Warren Heustis & Son, Collection	1 00

June 9.

Gratuities : —

Winter Brothers, Tomatoes	1 00
Warren Heustis & Son, Collection	1 00

June 16.

Gratuities : —

Walter Russell, Maud S. Peas	1 00
Cephas H. Brackett, Alaska Peas	1 00
Charles E. Grant, Peas and Asparagus	2 00
Warren Heustis & Son, Collection	2 00

ROSE AND STRAWBERRY SHOW.

June 20 and 21.

Beets.— Twelve Summer Turnip Rooted, Sumner Coolidge	3 00
Second, Charles A. Learned	2 00
Third, Warren Heustis & Son	1 00

Onions.—Twelve, Charles A. Learned	$3 00
Second, Sumner Coolidge	2 00
Third, Hon. Joseph S. Fay	1 00
Cucumbers.—Pair of White Spine, Warren Heustis & Son	3 00
Second, Charles A. Learned	2 00
Third, Walter Russell	1 00
Lettuce.— Four heads, Hon. Joseph S. Fay, Deacon	3 00
Second, Hon. Joseph S. Fay, Tennisball	2 00
Third, " " " All Seasons	1 00
Peas.— Half-peck, Hon. Joseph S. Fay, American Wonder	3 00
Second, Charles E. Grant, " "	2 00
Third, John P. Spaulding " "	1 00
Gratuities : —	
William H. Hunt, Asparagus	1 00
Fred Grinnell, Marquis of Lorne Cucumbers	2 00
W. N. Craig, Cucumbers and Tomatoes	2 00
Hon. Joseph S. Fay, Cauliflowers	2 00
Charles A. Learned, "	1 00
Hon. Joseph S. Fay, Lettuce	1 00
Moses T. Stevens, Lettuce and Tomatoes	2 00
Winter Brothers, Three varieties of Tomatoes	2 00
Thomas Waldie, Potatoes and Cabbages	2 00
Warren Heustis & Son, Collection	3 00

June 30.

Potatoes.— Twelve specimens, Hon. Joseph S. Fay, Early Rose	3 00
Second, Hon. Joseph S. Fay, Savoy	2 00
Third, " " " Hebron	1 00
Onions.— Twelve specimens, Hon. Joseph S. Fay	2 00
Second, Sumner Coolidge	1 00
Squashes.— Four Long Warted, Sumner Coolidge	2 00
Second, Warren Heustis & Son	1 00
Four Scalloped, Sumner Coolidge	2 00
Peas.— Half-peck of American Wonder, Isaac E. Coburn	3 00
Second, P. G. Hanson	2 00
Third, Hon. Joseph S. Fay	1 00
Any other variety, John L. Gardner, Champion	3 00
P. G. Hanson, Advancer	2 00
Charles E. Grant, "	1 00
Gratuities : —	
Sumner Coolidge, Beans	2 00
Elisha S. Converse, Tomatoes	1 00
Moses T. Stevens, "	1 00
W. N. Craig, "	1 00
Hon. Joseph S. Fay, Collection of Lettuce	2 00
Warren Heustis & Son, Collection	1 00
Walter Russell, "	1 00

JULY 7.

POTATOES.— Twelve specimens, Hon. Joseph S. Fay, Hebron	$3 00
Second, Hon. Joseph S. Fay, Savoy	2 00
Third, " " " Rose	1 00
SQUASH.— Four Long Warted, Sumner Coolidge	2 00
BEANS.—Half-peck of String, of any variety, Sumner Coolidge, Flageolet	3 00
Second, Sumner Coolidge, Kidney Wax	2 00
Third, " " Golden Wax	1 00
PEAS.— Half-peck of any other variety than Stratagem, Hon. Joseph S. Fay, Advancer	3 00
Second, Isaac E. Coburn, Heroine	2 00
Third, Charles E. Grant, Advancer	1 00

Gratuities:—

John L. Gardner, Beans	1 00
W. N. Craig, "	1 00
Charles A. Learned, Onions	1 00
Warren Heustis & Son, Collection	2 00
Sumner Coolidge, "	2 00
Walter Russell, "	2 00

JULY 14.

Levi Whitcomb Fund.

CABBAGES.— Three Drumhead, trimmed, Warren Heustis & Son, All Seasons	3 00
Second, Warren Heustis & Son, No. 2	2 00
PEAS.— Half-peck of any variety, Isaac E. Coburn, Heroine	3 00
Second, Hon. Joseph S. Fay, Heroine	2 00
Third, Isaac E. Coburn, Stratagem	1 00
SWEET CORN.— Twelve ears, Sumner Coolidge, Corey	3 00
TOMATOES.— Open culture, twelve specimens, Varnum Frost, Comrade	3 00
Second, Samuel J. Trepess, May's Favorite	2 00
Third, Warren Heustis & Son, Comrade	1 00

Gratuities:—

Hon. Joseph S. Fay, Potatoes	1 00
Sumner Coolidge, Collection of fifteen varieties	4 00
Warren Heustis & Son, Collection	1 00
Charles E. Grant, "	1 00
Walter Russell, "	1 00

JULY 21.

POTATOES.— Twelve specimens, Isaac E. Coburn	3 00
LETTUCE.—Four heads of any variety, Warren Heustis & Son	3 00

Sweet Corn.— Twelve ears, Sumner Coolidge, Crosby . . . $3 00
Second, Sumner Coolidge, Corey 2 00
Third, Charles E. Grant, Burpee's Early 1 00
Tomatoes.— Open culture, twelve specimens, Samuel J. Trepess, May's Favorite 3 00
Second, Varnum Frost, Comrade 2 00
Third, Warren Heustis & Son, " 1 00

Gratuities : —

Sidney Lawrence, Stratagem Peas 1 00
C. H. Goddard, " " 1 00
Isaac E. Coburn, Peas 1 00
Moses T. Stevens, Tomatoes 1 00
W. N. Craig, Cardiff Castle Cucumbers 1 00
Sumner Coolidge, Collection 5 00
Warren Heustis & Son, " 4 00
Charles E. Grant. " 2 00
Walter Russell, " 1 00

July 28.

Potatoes.— Any variety, twelve specimens, Isaac E. Coburn, Hebron 3 00
Second, Hon. Joseph S. Fay, Hebron 2 00
Third, Isaac E. Coburn, Savoy 1 00
Squashes.— Three Marrow, Warren Heustis & Son . . . 3 00
Peas.— Half-peck of any variety, E. Lawrence, Stratagem . . 3 00
Second, C. H. Goddard, Stratagem 2 00
Third, Charles E. Grant, Shropshire Hero 1 00
Sweet Corn.— Twelve ears of Crosby, Samuel Hartwell . . 3 00
Twelve ears of any other variety, Sumner Coolidge, Corey . . 3 00
Second, Charles E. Grant, Fordhook 2 00
Tomatoes.— Twelve specimens, Samuel J. Trepess . . . 3 00
Second, Isaac E. Coburn 2 00

Gratuities : —

Sumner Coolidge Collection 2 00
Warren Heustis & Son, " 1 00
Walter Russell, " 1 00
J. Murphy, for a New Variety of Mushroom, First-Class Certificate of Merit.

August 4.

Beans.— Two quarts of Goddard, Charles E. Grant . . . 3 00
Second, Rev. Calvin Terry 2 00
Half-peck of Horticultural, Isaac E. Coburn 3 00
Second, Warren Heustis & Son 2 00
Tomatoes.— Twelve specimens of Acme, Samuel J. Trepess . 3 00
Second, John P. Spaulding 2 00
Twelve specimens of Emery, Aaron Low 3 00

Twelve specimens of any other variety, Isaac E. Coburn, Ignotum $3 00
Second, Samuel J. Trepess, May's Favorite . . . 2 00
Third, W. N. Craig, " " . . . 1 00
Egg Plant.— Four specimens of Round Purple, Sumner Coolidge 3 00

Gratuities: —

W. N. Craig, Globe Artichokes 1 00
Samuel Hartwell, Crosby Corn 1 00
Sumner Coolidge, Collection 3 00
P. G. Hanson, " 2 00
Charles W. Parker, " 1 00

August 11.

Sweet Corn.— Twelve ears, P. G. Hanson 3 00
Second, F. J. Kinney 2 00
Third, Sumner Coolidge 1 00
Egg Plant.— Sumner Coolidge 2 00
Second, Charles A. Learned 1 00

Gratuities: —

H. R. Kinney, Endive and Lettuce 2 00
Warren Heustis & Son, Collection. 2 00
Charles E. Grant, " 2 00
P. G. Hanson, " 2 00
Sumner Coolidge " 2 00
W. N. Craig, " 1 00

August 18.

Potatoes.— Twelve specimens of any variety, Samuel Hartwell . 3 00
Second, Isaac E. Coburn 2 00
Third, P. G. Hanson 1 00
Onions.— Twelve Specimens, W. N. Craig 3 00
Second, Charles A. Learned 2 00
Third, Sumner Coolidge 1 00
Celery.— Four roots of any variety, Warren Heustis & Son . . 3 00
Second, Wyman Brothers 2 00
Third, W. N. Craig 1 00
Beans.— Two quarts of Large Lima, Varnum Frost . . . 3 00
Second, Charles E. Grant 2 00
Two quarts of Dwarf Lima, Isaac E. Coburn 3 00
Second, Charles E. Grant 2 00
Two quarts of Goddard, shelled, Isaac E. Coburn . . . 3 00
Second, Oliver R. Robbins 2 00
Third, Charles E. Grant 1 00
Sweet Corn.— Twelve ears of Potter's Excelsior, P. G. Hanson . 3 00
Second, Samuel J. Trepess 2 00

Twelve ears of any other variety, P. G. Hanson, Quincy Market	$3 00
Second, Charles A. Learned, Crosby	2 00
Third, Oliver R. Robbins "	1 00
Peppers.— Twelve specimens of Squash, P. G. Hanson	3 00
Second, Nathaniel T. Kidder	2 00
Third, George Lincoln	1 00
Twelve specimens of any other variety, Nathaniel T. Kidder, Bull Nose	3 00
Second, E. C. Lewis, Ruby King	2 00
Third, Varnum Frost, " "	1 00

Gratuities: —

Samuel J. Trepess, Tomatoes	1 00
Warren Heustis & Son, Collection	2 00
P. G. Hanson, "	2 00
Charles A. Learned, "	2 00
Sumner Coolidge, "	2 00
W. N. Craig, "	1 00
Walter Russell, "	1 00

August 25.

Cabbages.— Three of any variety, trimmed, John P. Spaulding	3 00
Second, Samuel J. Trepess	2 00
Third, E. C. Lewis	1 00
Cauliflowers.— Four specimens, A. M. Knowlton	3 00
Second, William H. Teele	2 00
Celery.— Four roots, Warren Heustis & Son	3 00
Second, E. C. Lewis	2 00
Beans.— Two quarts of Large Lima, Varnum Frost	3 00
Second, Charles E. Grant	2 00
Two quarts of Dwarf Lima, John P. Spaulding	3 00
Second, Isaac E. Coburn	2 00
Third, Charles E. Grant	1 00
Martynias.— Twelve specimens, Walter Russell	2 00
Second, Marshall W. Chadbourne	1 00
Peppers.— Twelve specimens of Squash, P. G. Hanson	3 00
Second, George W. Jameson	2 00
Third, Nathaniel T. Kidder	1 00
Twelve of any other variety, E. C. Lewis, Ruby King	3 00
Second, Nathaniel T. Kidder, Bull Nose	2 00

Gratuities: —

Varnum Frost, Lima Beans	1 00
Warren Heustis & Son, Celery	1 00
Samuel Hartwell, Collection	2 00
E. C. Lewis, "	2 00

Charles B. Grant, Collection $1 00
P. G. Hanson, " 1 00
Isaac E. Coburn, " 1 00
Calvin Terry, " 1 00
Sumner Coolidge, " 1 00

SEPTEMBER 5.

Gratuity:—

William H. Teele, Cauliflowers 1 00

SEPTEMBER 15.

GREENFLESH MELONS.— Four specimens, E. C. Lewis . . . 3 00
Second, Nathaniel T. Kidder 2 00
Third, Samuel Hartwell 1 00
SALMON FLESH MELONS.— Four specimens, Hon. Aaron Low . 3 00
Second, Charles E. Grant 2 00
Third, Charles E. Grant 1 00
WATERMELONS.— Two specimens, Charles E. Grant . . . 3 00
Second, John Parker 2 00
Third, Charles E. Grant 1 00
CAULIFLOWERS.— Four specimens, A. M. Knowlton . . . 3 00
Second, William H. Teele 2 00
LETTUCE.— Four heads of any variety, Sumner Coolidge . . 3 00
Second, John L. Gardner 2 00
Third, H. R. Kinney 1 00
CELERY.— Four roots of any variety, Wyman Brothers . . . 3 00
Second, Warren Heustis & Son 2 00
Third, Walter Russell 1 00
PARSLEY.— Richard T. Lombard 2 00
Second, Mrs. Mary T. Goddard 1 00
BEANS.— Large Lima, two quarts, Varnum Frost 3 00
Second, Charles E. Grant 2 00
Third, John P. Spaulding 1 00
SWEET CORN.— Twelve ears of Potter's Excelsior, Charles B. Lancaster 3 00
Second, Isaac E. Coburn 2 00
Third, Charles E. Grant 1 00
Twelve ears of any other variety, Oliver R. Robbins, Hickox Sweet 3 00
Second, Marshall W. Chadbourne, Stowell's 2 00
Third, John L. Gardner, Crosby 1 00
EGG PLANT.— Four Round Purple, Sumner Coolidge . . . 3 00
Second, Nathaniel T. Kidder 2 00
Third, H. R. Kinney 1 00
TOMATOES.— Three varieties, twelve specimens each, Varnum Frost 5 00
Second, Hon. Aaron Low 4 00
Third, John L. Gardner 3 00

Twelve Acme, Mrs. Mary T. Goddard	$3 00
Second, Charles E. Grant	2 00
Third, Nathaniel T. Kidder	1 00
Twelve Cardinal, Varnum Frost	3 00
Second, Hon. Aaron Low	2 00
Third, Charles E. Grant	1 00
Twelve Ignotum, Isaac E. Coburn	3 00
Second, Varnum Frost	2 00
Third, Calvin Terry	1 00
Twelve Paragon, Varnum Frost	3 00
Second, P. G. Hanson	2 00
Third, George F. Stone	1 00
Twelve of any other variety, Varnum Frost, Stone	3 00
Second, Nathaniel T. Kidder, May's Favorite	2 00
Third, Hon. Aaron Low, Aristocrat	1 00
Peppers.— Twelve specimens of Squash, P. G. Hanson	3 00
Second, Isaac E. Coburn	2 00
Third, George W. Jameson	1 00
Twelve specimens of any other variety, Nathaniel T. Kidder, Bull Nose	3 00
Second, E. C. Lewis, Bull Nose	2 00
Third, Varnum Frost " "	1 00
Gratuities : —	
Charles A. Learned, Collection	2 00
H. R. Kinney, "	2 00
Hon. Aaron Low, "	2 00
Walter Russell, "	1 00

ANNUAL EXHIBITION OF FRUITS AND VEGETABLES.

October 3 and 4.

Special Prizes.

Cauliflowers.— Best four specimens, and best kept during the exhibition, William H. Teele	5 00
Second, A. M. Knowlton	4 00
Celery.— Best four specimens and best kept during the exhibition, Warren Heustis & Son	8 00
Second, Wyman Brothers	6 00

Regular Prizes.

Beets.— Twelve Turnip Rooted, Varnum Frost	3 00
Second, Warren Heustis & Son	2 00
Third, H. R. Kinney	1 00

Carrots.— Intermediate, H. R. Kinney	$3 00
Second, Mrs. J. W. Clark	2 00
Third, Warren Heustis & Son	1 00
Parsnips.— Twelve Long, Charles A. Learned	3 00
Second, H. R. Kinney	2 00
Third, Francis Brown Hayes	1 00
Potatoes.— Four varieties, twelve specimens each, Isaac E. Coburn	5 00
Second, E. R. Cook	4 00
Third, Charles B. Lancaster	3 00
Clark, twelve specimens, Mrs. Mary T. Goddard	3 00
Second, E. R. Cook	2 00
Third, Isaac E. Coburn	1 00
Hebron, Isaac E. Coburn	3 00
Second, P. G. Hanson	2 00
Third, H. R. Kinney	1 00
Rose, P. G. Hanson	3 00
Second, H. R. Kinney	2 00
Third, E. C. Lewis	1 00
Savoy, Isaac E. Coburn	3 00
Any other variety, H. R. Kinney, Potentate	3 00
Second, Mrs. Mary T. Goddard, Queen	2 00
Third, John L. Gardner, Rochester Rose	1 00
Salsify.— Twelve specimens, Charles A. Learned	3 00
Second, H. R. Kinney	2 00
Turnips.— Twelve Flat, H. R. Kinney	2 00
Second, Francis Brown Hayes	1 00
Twelve Swedish, E. C. Lewis	2 00
Second, Mrs. Mary T. Goddard	1 00
Onions.— Twelve Danvers, Charles A. Learned	3 00
Second, W. N. Craig	2 00
Third, Sumner Coolidge	1 00
Red, Mrs. J. W. Clark	3 00
Second, Sumner Coolidge	2 00
Third, H. R. Kinney	1 00
White, Walter Russell	3 00
Squashes.— Three Hubbard, E. C. Lewis	3 00
Second, Samuel Hartwell	2 00
Third, Charles E. Grant	1 00
Hybrid Turban, E. C. Lewis	3 00
Marblehead, E. C. Lewis	3 00
Second, P. G. Hanson	2 00
Marrow, Varnum Frost	3 00
Second, Warren Heustis & Son	2 00
Third, Sumner Coolidge	1 00
Brussels Sprouts.— Half-peck, John L. Gardner	3 00
Second, John P. Spaulding	2 00
Third, Richard T. Lombard	1 00

Cabbages.— Three Drumhead, trimmed, Oliver R. Robbins	$3 00
Second, P. G. Hanson	2 00
Third, Mrs. Mary T. Goddard	1 00
Red, E. C. Lewis,	3 00
Second, P. G. Hanson	2 00
Savoy, Mrs. Mary T. Goddard	3 00
Second, E. C. Lewis	2 00
Cauliflowers.— Four specimens, William H. Teele	3 00
Second, A. M. Knowlton	2 00
Third, P. G. Hanson	1 00
Celery.— Paris Golden, four roots, best kept, Warren Heustis & Son	5 00
Second, Wyman Brothers	4 00
Third, Walter Russell	3 00
Any other variety, Warren Heustis & Son, Perle le Grand	5 00
Endive.— Four specimens, Marshall W. Chadbourne	3 00
Second, H. R. Kinney	2 00
Third, Mrs. M. H. Haller	1 00
Lettuce.— Four heads, Sumner Coolidge	3 00
Second, E. C. Lewis	2 00
Third, Warren Heustis & Son	1 00
Parsley.— Two quarts, Richard T. Lombard	2 00
Second, W. N. Craig	1 00
Horseradish.— Six roots, H. R. Kinney	3 00
Second, Charles A. Learned	2 00
Egg Plant.— Four Round Purple, H. R. Kinney	3 00
Second, Sumner Coolidge	2 00
Third, Charles A. Learned	1 00
Tomatoes.— Three varieties, twelve specimens each, Hon. Aaron Low	5 00
Second, Varnum Frost	4 00
Third, John L. Gardner	3 00
Acme, twelve specimens, Hon. Aaron Low	3 00
Second, Charles E. Grant	2 00
Emery, Hon. Aaron Low	3 00
Paragon, Charles E. Grant	3 00
Second, Hon. Aaron Low	2 00
Third, Varnum Frost	1 00
Cardinal, Hon. Aaron Low	3 00
Second, Charles E. Grant	2 00
Third, Varnum Frost	1 00
Any other variety, Hon. Aaron Low, Comrade	3 00
Second, Nathaniel T. Kidder, May's Favorite	2 00
Third, Hon. Aaron Low, Essex Hybrid	1 00
Peppers.— Twelve specimens of Squash, Hon. Aaron Low	3 00
Second, George W. Jameson	2 00
Third, P. G. Hanson	1 00
Any other variety, George W. Jameson, Ruby King	3 00

Second, E. C. Lewis, Bull Nose	$2 00
Third, Nathaniel T. Kidder, Bull Nose	1 00

Gratuities: —

J. A. Foster, Sweet Corn, Bourn's Favorite	1 00
Nathaniel T. Kidder, Sweet Corn	1 00
L. J. Fosdick, four varieties of Popping Corn	1 00
Hon. Aaron Low, Collection of twenty varieties of Tomatoes	4 00
Nathaniel T. Kidder, Watermelons	2 00
John Parker, "	1 00
Mrs. Mary T. Goddard, Lima Beans	1 00
John P. Spaulding, " "	1 00
J. A. Hendrie, *Lycoperdon giganteum*	1 00
H. R. Kinney, Collection	5 00
Charles A. Learned, "	3 00
George W. Jameson, "	2 00
P. G. Hanson, "	2 00
Charles E. Grant, "	2 00
Walter Russell, "	2 00
S. Bedrossia, "	1 00
Warren Heustis & Son, "	1 00

NOVEMBER 6.

Gratuity: —

Warren Heustis & Son, Celery	3 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

NOVEMBER 17.

CUCUMBERS.— Pair, C. Cummings	3 00
CABBAGES.— Three Red, trimmed, the Third prize to E. C. Lewis	1 00
Three Savoy, Mrs. Mary T. Goddard	3 00
Second, John Parker	2 00
Third, E. C. Lewis	1 00
CELERY.— Four roots, Warren Heustis & Son	3 00
Second, Varnum Frost	2 00
Third, E. C. Lewis	1 00
LETTUCE.— Four heads, J. C. Stone	3 00
TOMATOES.— Twelve specimens, Winter Brothers, Chemin	3 00
Second, Winter Brothers, Nicholson's Hybrid	2 00
Third, Winter Brothers, Pres. Cleveland	1 00

Gratuities: —

C. Cummings, Cucumbers	$1 00
John P. Spaulding, Brussels Sprouts	1 00
Mrs. E. M. Gill, Sweet Potatoes	1 00
Warren Heustis & Son, Collection	2 00
E. C. Lewis, "	2 00
Charles E. Grant, "	2 00
George W. Jameson, "	2 00

FIRST CLASS CERTIFICATE OF MERIT.

July 28. J. Murphy, for a New Variety of Mushroom.

REPORT

OF THE

COMMITTEE ON GARDENS,

FOR THE YEAR 1894.

By JOHN G. BARKER, Chairman.

The past season has not given us the scope of observation that we had hoped would be furnished. The reason for this failure you may be quite as able to conjecture as your Committee. Undoubtedly the extremely dry weather had something to do with it. There are few who care to invite the Committee to inspect their grounds, unless they are fairly presentable, and when we consider that the growing season of 1893 was quite dry, and that of 1894 was much more so, it will be seen at once, that these two successive extremely dry seasons had a very serious effect on many places, especially on the lawns. We all realize how much good grass adds to the beauty of any place, and makes even the smallest dooryard attractive. The long-continued drought, so general all over the country, made work very hard, and it is almost a wonder that, when the fall rains did come, vegetation was so quickly restored, and so little was lost. Doubtless the greatest loss was among newly-planted trees and shrubs, where water could not be readily obtained to supply them with sufficient moisture to sustain the life remaining in them. For many years nothing like the past season's dry weather has been experienced; and we sincerely hope we may not soon have another like it.

The Schedule of Prizes has not proved attractive, notwithstanding it has been rearranged nearly every season, and in such a way that we had hoped the prizes would bring a reasonable competition. But we did not succeed, excepting with the class for

Chrysanthemums. All of these prizes brought competitors, and all were awarded. However, we have not been idle, having made nine different visits, and we trust that the statements of the various persons whose places we visited, may prove interesting and profitable, and worthy of your careful consideration. Our first visit was to

Oakmount, the Residence of Francis Brown Hayes, Lexington.

The Rhododendrons constituted the principal object of the visit. The large tent, one hundred and seventy-five feet long by seventy-five feet wide, under which so many splendid specimens were growing, was a truly beautiful sight. It has been our privilege to see and admire them many times; but the conclusion of the Committee at this visit was, that the display had never looked better. No amount of pains or money have been spared to make this collection one of the very best in the country, and the generosity of the proprietor in allowing the public freely to visit his grounds is highly appreciated, as the large number of visitors constantly coming and going gave most abundant evidence.

No adequate idea of the great amount of labor that is required to maintain such a display can be given in words, especially when it is known that a large portion of them have to be removed every season, and placed in a spacious pit, which has been constructed for this purpose. This pit is one hundred and sixty feet long, forty feet wide, six feet high at the front, and twelve feet at the back. The roof is of matched boards, covered with tarred paper and shingled. There are raised skylights in the roof, but in winter the roof is covered with leaves. Air is given every fine day, but the temperature is kept as near 38° as possible all winter.

In addition to the Rhododendrons there are Hollies, Hydrangeas, Azaleas, Bay Trees, Araucarias, and many other half-hardy plants stored in this pit. The value of a pit of this description cannot be over-estimated, and when we consider its usefulness, the wonder is, that there are not many more of them upon the estates where such plants are used.

We append a list of Rhododendrons which have been growing at Oakmount successfully for fifteen years, and have proved perfectly hardy; a list of Half Hardy varieties, all of which have

flowered at Oakmount, and which will be a reliable guide to any one making up a collection; and a list of Ornamental Evergreens which have proved satisfactory.

Hardy Rhododendrons.

Album elegans.— Blush, nearly white; very showy; flowers very freely, and is of fine habit.

Album grandiflorum.—White, with green eye; tall grower.

Album triumphans.— A very fine, large, white flower.

Aurora.— Bright rosy lake; free, and late bloomer.

Atrorubrum.— Crimson; early.

Atrosanguineum.— Intense blood red; fine foliage; one of the hardiest.

Caractacus.— Rich purplish crimson; splendid truss, foliage, and habit; one of the finest.

Butlerianum.— A good white, faintly tinged with pink.

Cabrera.— Clear rosy crimson.

Charles Dickens.— Dark scarlet; fine habit and foliage.

Distinction.— Rosy crimson with darker spots.

Erectum.— Light crimson.

Everestianum.— Rosy lilac, spotted and fringed; an excellent, free-blooming sort.

Ferrugineum.— A sweet-scented, dwarf-growing variety.

Flora.— Rosy blush.

Geranoides.— Rose, very dark spots.

H. W. Sargent.— Crimson; very large trusses.

Lefevreanum.— Dark purplish crimson.

Luciferum.— Clear white; one of the best.

Macranthum grandiflorum.—Dark rosy lilac, spotted; fine form and truss.

Macranthum nigrum.— Dark purple, spotted.

Macranthum roseum.

Maculatum roseum.— Dark rose, finely marked.

Maculatum purpureum.— Light purple, spotted; large bold truss of blooms.

Multimaculatum.— White with red spots; a very distinct and effective variety.

Purpureum elegans.— Very fine purple.

Purpureum grandiflorum.— Dark purple.

Roseum pictum.— Rose with yellow eye.
Roseum elegans.— Rose; very hardy.
Roseum grandiflorum.— Deep rose; late.

Half-Hardy Rhododendrons.

Auguste Van Geert.— Light rosy purple, brown spots.
Austen Layard.— Fine rosy crimson, with dark spots; close, handsome truss, fine habit.
Barclayanum.— Deep rosy crimson; a fine variety.
Baron Schroder.— Plum color, yellowish centre.
Blatteum.— Claret crimson; large truss.
Broughtoni.— Rosy crimson.
Chionoides.— Yellowish white; large truss.
Comte Gomer.— Deep rosy crimson; compact truss.
Correggio.— Dark scarlet.
Countess of Cadogan.— Clear rose; compact truss.
Countess of Clancarty.— Light rosy crimson, very prettily marked; very large, bold trusses of blooms.
Countess of Coventry.— White with yellow spots, splendid color.
Countess of Headford.— Lilac rose, much spotted.
Countess of Ilchester.— Scarlet edges, pale centre.
Countess of Normanton.— Pale rose with dark markings.
Duchess of Bedford.— Pale rose, light centre.
Duchess of Cambridge.— Bright crimson-scarlet, pale centre.
Duchess of Edinburgh.— Crimson, light centre.
Duchess of Sutherland.— White centre, shading to a broad margin of rosy lilac.
Dhuleep Singh.— Dark chocolate-crimson; of great substance.
Enchantress.— A good white with yellow spots.
Exquisite.— Pure white, blotched with buff.
Fastuosum flore pleno.— Mauve; large truss, remaining a long time in bloom.
Fleur de Marie.— Rosy crimson, light centre.
Frederick Waterer.— Crimson, very showy.
Frank Gomer Waterer.— Scarlet, light centre.
Galbanum.— Light rosy crimson margin.
General Canrobert.— Dark scarlet, with cluster of dark spots.
Helen Waterer.— Centre white, edged with crimson.
Hendersonii.— Purplish crimson.

Jack Waterer.— Scarlet, light centre.

Jean Verschaffelt.— Light rosy crimson.

John Henry Agnew.— Pale blush, with chocolate spots.

John Walter.— Rich crimson; fine form and habit.

John Waterer.— Dark crimson; a fine free-blooming kind.

Joseph Whitworth.— Rich, dark lake spots.

Jubar.— Light pink; an exceedingly pretty variety.

Kate Waterer.— Rose with yellow centre; very showy.

Kate Alice Waterer.— Has a beautiful scarlet edge.

Lady Eleanor Cathcart.— Pale rose, spotted with chocolate; very beautiful.

Lady Grenville.— White centre, margined with purple.

Lady Olive Guinness.— White, spotted with chocolate.

Loquendum.— Scarlet, white centre — a new color.

Lord Eversley.— Very dark crimson with black spots.

Louisa.— Fine rosy scarlet; good habit.

Lord Selborne.— Intense crimson; a magnificent kind.

Michael Waterer.— Crimson spotted; fine.

Mrs. John Kelk.— Clear rose; late.

Mrs. Layard.— White centre, margined with rosy crimson.

Mrs. Williams.— Light rose; fine truss.

Mrs. Russell Sturgis.— White spotted with chocolate.

Mrs. Thomas Brassey.—Clear white, margined with rosy purple.

Mrs. Thomas Longman.— Rosy crimson; large truss.

Mrs. Thomas Agnew.— White with yellow blotch.

Mrs. William Agnew.— Pale rose, yellow centre.

Oculatum.— Clear white with a fine cluster of orange spots.

Oculatum nigrum.— Pale lilac with a large dark eye.

Princess Hortense.— Peach blossom with a brown and yellow eye; fine pyramidal truss.

Princess Mary of Cambridge.— Light blush, deeper edging.

Princess of Wales.— White centre with magenta edge.

Queen.— Blush, changing to white; fine shape.

Ornamental Evergreens.

Abies Clanbrasiliana (Lord Clanbrasil's) is a small and compact growing bush. The original plant is said to have been found on the estate of Lord Clanbrasil, at Moira, near Belfast.

Abies elegans is another of the pretty little dwarfs, with very slender light green foliage. The growth is compact and it is a desirable variety.

Abies nigra.—An ornamental tree, with shorter leaves and branchlets; of more compact habit and darker hue than *A. alba.*

Abies pyramidalis is said to be a French variety; it differs from the species in being remarkably fastigiate and of very compact growth.

Abies Hookeriana.—The late Andrew Murray described this in Lawson's "Pinetum Britannicum" as an Alpine, with a spreading and irregular, but remarkably graceful habit; thickly branched, and clothed with light feathery foliage; "leaves slightly curved, with a rib in the middle, and sometimes depressed above, so as to give the leaf a triangular, or boat-shaped form; rich, grassy-green above, pale green and very slightly silvery beneath, except when young and fresh; closely but irregularly set along the young branches, chiefly on the upper side, except at the extremity of the shoot, where they surround the whole twig."

Abies lasiocarpa.—Known also as *A. Lowiana*, and *A. Parsonsi.* A handsome, quick-growing species.

Abies magnifica.—A noble tree, quite hardy; sometimes known as *A. nobilis robusta.*

Abies Menziesii appears to thrive best where the soil is moist the greater part of the year. It is an ornamental species, with sharp-pointed leaves, which are silvery beneath.

Abies Mertensiana (California Hemlock Spruce).—This forms a roundish conical head, is very dense and compact in growth, and remarkably graceful in the arrangement of its branches.

Abies robusta.—A variety of *A. nobilis*, the Noble Silver Fir, which Douglas styled "beautiful and immensely large trees."

Abies Morinda Smithiana.—A remarkably beautiful tree, not unlike the Norway Spruce in shape and character, but more graceful in growth and delicate in color.

Abies nobilis (the Noble Silver Fir) is quite vigorous in growth, beautiful in verdure, regular and graceful in form, of large size; it has ivy-colored, dark green leaves, with horizontal, outspreading branches.

Abies Nordmanniana.—A handsome tree, with ample branches and brightly varnished foliage. The growth is vigorous, regular, and graceful in form.

Abies orientalis (Eastern Spruce).—This has been classed as a variety of *A. alba* and also of *A. excelsa.* It is of a regular, conical form, and so thick and close as to be considered a perfect model of the compact form of conifers.

Abies pectinata (the European, or Common Silver Fir) is not generally recommended for cultivation.

Abies Veitchii.— From Mount Fusi-Yama, on the Island of Hondo, Japan. The mountain is 12,440 feet high—the highest in Japan. This beautiful and interesting tree attains the height of one hundred feet (some say one hundred and forty feet), thickly furnished with whorls of slightly ascending branches. Its leaves are but one inch, or less, in length, thickly set all around the branch. The cones are the smallest of all the varieties; the scales very closely packed.

Abies Webbiana.—A noble silver fir, from the Himalayas. A pyramidal tree with broad, spreading branches.

Pinus Austriaca.—A spreading tree of rapid growth; foliage dark and handsome. It is very valuable for many purposes, especially for wind-breaks, or single specimens.

Pinus Bungeana.—The character and habit of this tree is marked and peculiar. It is a beautiful, distinct, and hardy Chinese species, rare in cultivation.

Pinus Cembra (Swiss Stone Pine).—A hardy species, forming a handsome regular cone, clothed with branches to the ground; very dense in its growth, and should be in every collection.

Pinus excelsa.—A fine, spreading tree, with drooping, bluish-green leaves. It is very desirable for parks and lawns, as from its remarkably graceful, drooping habit, it is peculiarly appropriate for single specimens.

Pinus insignis (the Monterey Pine).—A most beautiful species, with rich, glossy, deep green foliage.

Pinus Jeffreyi (Jeffrey's Pine).— A noble tree, in general appearance resembling *P. Benthamiana*, yet very different from that species, having more slender branchlets, and foliage of a deep bluish green.

Pinus Lambertiana (Lambert's Pine).—Scott says: "It resembles our White Pine so much that common observers would suppose it the same. We have seen no quality that should cause it to be recommended for planting, our white pine being its equal or superior in all respects."

Pinus Laricio (the Corsican Pine).—Henry W. Sargent says of it: "It is quite as hardy as the Austrian Pine all over the country, having somewhat the same robust habit, only a less vivid green." Its growth is rather more loose and open than that of the

Austrian pine, the space between the whorls of its branches being much greater, and, taken altogether, it is a less pleasing tree.

Pinus ponderosa (the Heavy Wooded Pine).—A California tree of great size, and coarse rapid growth. We quote from Hoopes's "Book of Evergreens": "As an ornament we are rather inclined to believe it will not prove so popular as many others of our new Rocky Mountain Pines, owing to the coarse and somewhat open appearance of the tree. Yet on the other hand, its remarkable vigor, excessive hardiness, and dark-green foliage, will certainly weigh in its favor, and may eventually counterbalance all obstacles to its becoming a favorite kind."

Pinus radiata (Radiated-Scaled Pine).—Mr. Hoopes says: "Although our experience with this tree has been so very discouraging, we nevertheless include it in our list for the benefit of those who desire to test its availability."

Pinus Strobus (the White Pine).—This is one of the oldest, best known, and most useful of all the pines.

Juniperus communis is a spreading shrubby bush, usually from three to seven or more feet high, and is well known.

Juniperus Hibernica (the Irish Juniper).—This is believed to be the most slender of all the evergreens; and for that reason is particularly useful on small places. While occupying a very small space it is conspicuous by its height.

Juniperus interrupta.—A synonym of *J. oblongata* of London.

Juniperus alba variegata.—This is one of the many forms of *J. Virginiana*, or Red Cedar. Owing to the dark hue of the self-colored foliage, the white spots and stripes are more conspicuous than usual.

Juniperus densa (the Dense-growing Indian Juniper).—The species is from the Bhotan, or Nepaul country in Asia. We find there are various experiences with it as to hardiness, but at Oakmount there has apparently been no trouble in this direction.

Juniperus sabina variegata (Variegated-leaved Savin).—Hoopes's excellent description is as follows: "A very distinct and prettily marked variety, equally as hardy as the parent, and valuable for inserting in a group of dwarf evergreens, on rockwork. A portion of the leaves are pure white, intermixed with pale lemon-yellow and the usual dark sombre green of the species. It is not so vigorous in growth as its parent however."

Retinospora leptoclada is of dense, compact, pyramidal growth, furnished with branches to the ground; foliage more or less glaucous; it is handsome and desirable for choice beds or borders.

Retinospora lycopodioides.—A species brought to notice by collectors in Japan. It is very graceful and attractive in appearance, its leaves resembling small dark green scales, and the branches spreading somewhat like those of *R. obtusa.*

Retinospora filifera (Thread-branched Retinospora).—The long, drooping, spray-like branches of this species are peculiarly graceful.

Retinospora pisifera.—Of small and more slender growth than *R. obtusa.* This is the common Cypress of Japan.

Retinospora argentea (Silver-spotted Plume-like Retinospora).—This species has soft, silvery, pale green foliage.

Retinospora plumosa (Feathery Retinospora).—Foliage of a beautiful glaucous hue; habit compact and elegant.

Retinospora squarrosa.—A small-sized tree, with graceful, drooping branches, and glaucous green foliage. It is considered tender, but several good specimens are to be found in the vicinity of Boston.

Sciadopitys verticillata.—The Umbrella Pine, from Mount Kojasanin, island of Nippon, Japan, where it is found as a tall conical tree upwards of one hundred feet high, with alternate, or verticillate branches, and leaves in double whorls of twenty or thirty each, varying from two to four inches in length. Adapted to nearly every department of ornamental planting.

William C. Strong's Estate, Waban.

The next visit of the Committee was to the grounds of Ex-President Strong, who has kindly given us the following account of some recent experiments in the cultivation of small fruits:

In the spring of 1893, I made a plantation of Strawberries in rows eighteen inches apart, and removed all runners as soon as they appeared. The plants have stooled so as to nearly cover the ground, with the exception of some weak kinds, like the Wolverton and Beder Wood. Another plot was well prepared and on July 22, of the same season, I planted twenty-five varieties in rows one hundred feet long and fifteen inches apart. Having a supply of water raised by a windmill and the season being favorable, the July plot made very strong growth,

completely covering the ground, with the exception of a few weak kinds, as in the first plot. The difference in productiveness of the spring planted and the July planted was slight, the larger size of the berries on the plants set in July making up for the greater number on the spring plants. Some varieties planted as late as August 5 to 19, were by no means as prolific as the earlier planted, although large berries were produced. All my plants had a moderate covering of pine needles, about an inch in depth, for the winter. Scarcely a plant was injured by the cold. The covering was removed April 5, which was too early, causing the plants to start, and some kinds, which blossomed early, to suffer by the frosts of May 10 and May 15.

Michel's Early was in bloom May 1, and was the first to ripen, yet it was but a day or two in advance of Haverland, and it is so inferior in size and quality that I shall drop it. Beder Wood is another variety so wonderfully prolific as to be worthless, it being impossible to develop berries of marketable size. Wolverton is too weak in growth, and the berries grow too close to the ground, although of good size and quality. It may be retained by the amateur. I shall drop Martha, Amherst No. 24, and Parker Earle. Haverland has been my best early variety. Bubach maintains its good repute. Such kinds as Sharpless, Belmont, Leader, Edgar Queen, Lovett, and Shuster's Gem, are continued in the rank and file.

Among the newer kinds, Marshall is *facile princeps*. It is productive, vigorous, of largest size, and yet excellent in quality. This is a combination which, in my opinion, cannot be claimed for any other variety. There were some signs of burning of foliage in the season of 1893, but this was not noticed this year. From present appearances the Marshall must be regarded as the most valuable addition to our list which has been made for many years.

Mary is a recent kind, very vigorous and productive, of the very largest size, and with me the latest of all. So far well, but the quality is not well. Beecher was not productive with me, but it was planted in August and a full crop could not be expected. Timbrell was quite promising and of good quality. Of Dayton and Greenville I do not wish to speak until after another trial.

Since fruiting, the rows have been cleaned of old foliage and any stray offsets; a dressing of muriate of potash, odorless phosphate, and nitrate of soda, has been strewed between the rows, and

a vigorous new growth has thus been obtained. We look for a fair crop for next season, but do not expect prize berries. For what length of time this hill system may be continued with profit I do not say; but it is clear that the largest berries (though possibly not the best) will come from new plantations.

My plot of Raspberries was planted in the spring of 1893, in rows four feet apart, and one foot apart in the row. With flat culture it was easy to keep down all suckers, leaving single stalks in a straight line, a foot apart. These were so stout as to be self-supporting the first season. When four feet high, they were clipped at the top and then allowed to throw out three or four branches. Just before the ground froze up, the canes were bent in line, and, as far as possible, were covered with earth taken from between the rows. In addition, the ground was well covered with forest leaves, which were kept in place by several loads of underbrush. This winter protection I regard as very important, in order to insure sound wood, full of sap, capable of nourishing fruit of the best quality. It is a misfortune to be induced to plant any variety said to be hardy in this our changing climate, for although fair crops may be secured they will not compare with the luscious fruit which is sure to come from the half-hardy, winter-protected sorts. I planted only the Cuthbert and the Golden Queen of the Red kinds; of the Black Caps a few Gregg and Lovett, under different treatment. The Black Caps are not wanted in our markets, by the side of the others, and even the beautiful Golden Queen is but sparingly taken, in comparison with Cuthbert. From this last variety the net sales were at least at the rate of $900 per acre. This, however, was in an exceptionally good market, where quality was fully appreciated. This autumn the canes are stronger and cannot be brought so close to the ground as last season, but a few more leaves and boughs will make them safe. Under proper treatment the plantation should continue indefinitely.

With me the North Star Currant is stronger in growth than the Victoria (*syn.* Raby Castle). In other respects it much resembles it. As to productiveness it is all sufficient. It is a misfortune to have over-productive varieties among small fruits. It is possible, but laborious, to thin pears and apples, but who would undertake to thin out the Beder Wood Strawberry, or a variety of Currant, in order to get fruit of good size? Great dis-

credit was thrown upon the Fay currant, when first introduced, by the assertion that it was "three times as prolific as the Cherry." Happily this was a slander upon this valuable variety.

Estate of Nathaniel T. Kidder, Milton.

Mr. Kidder's property comprises about sixteen acres of upland, in a long and narrow strip, sloping gently south to the highroad, and north to the Neponset meadows; also about two and one-half acres running out on the salt marsh. The avenue lies at the edge of the place, so that nearly the full width of the land is available for an undulating lawn, on which are several fine old American Elms. To the east of the house is a group of hardy Rhododendrons; in front two fine specimens of *Pyrus Japonica*, a group of Retinosporas and other ornamental plants. The veranda of the house is well covered with climbers. Passing to the west of the house, with a natural grove of Hickory and Oak at our left, the edges of the grove planted with shrubs and small trees, we come to an open field surrounded by representatives of the vegetation of many countries. We may mention *Oryxa Japonica*, *Magnolia stellata*. *Cercis Canadensis*, *Syringa Pekinensis*, and *Cercidiphyllum Japonicum*.

At the north end of this field two rows of Pear trees have recently been planted, which are only just beginning to bear. Also a row of Peaches, which have given some fair fruit for two or three years.

We are now opposite the stable of brick, built in 1880. The roadway which we have been following has here carried us nearly half across the land from west to east, but only about a quarter of the distance from south to north. Beyond the stable the road swerves to the left, passes amongst trees—chiefly Red Maple and Swamp White Oak—to the wooden barn, where the cows, pigs, and hens are kept; then it turns to the right, and again to the left. But we must go back to the brick stable, and will return to the wooden barn later.

Taking up our former position in front of the stable, we may go through an opening in the hedge and find ourselves in the garden, whose greatest attraction is the collection of herbaceous perennials, many of which have been exhibited in Horticultural Hall through

the summer. Here is the widest bed of these, rising at the back into a bold rockery, but other beds are found throughout the main part of the garden. On the right are the main greenhouses, covering about 35,000 square feet, with a variety of temperatures. In front of these is the hardy rose border. On the south and east sides are shrubberies, in which may be noted *Corylopsis paucifolia*, *Berberis Thunbergii*, *Rhododendron Vasegi*, and *Fothergilla Gardeni*.

On the north, these houses are protected by a high hedge, in the lee of which is a small border of herbaceous perennials. Just beyond is a long Grape arbor, running east and west, which serves in winter to support a close board fence, to shelter frames for violets, pansies, daisies, and the like. Some of the vines on this arbor are old, and not of the best varieties for this climate, and the less satisfactory vines are being replaced with varieties of more recent introduction, or which have been tested and found more fruitful.

We pass the end of this arbor and find on the left a row of Apple trees — old, but still in excellent bearing. Back of these apple trees, the grass beneath which is kept short, is an irregular band of Herbaceous Perennials; still back of these, during the years the place has been competing for the premium, several large Norway Spruces and other trees have been taken out and specimen ornamental shrubs planted in their stead. This group connects with a bed of longer standing, in which are Ericaceous and a few other choice shrubs. At the end of the path, placed so that it hides, in great part, the barn, is a group of Rhododendrons, planted thirty years ago and rising high above one's head. On the other side of this path, which we have followed since we came through the hedge, is the main path of the vegetable garden; one larger piece and two smaller, surrounded by gravel or grass paths and edged for the most part with borders of Herbaceous Perennials. These plots were, about forty-five years ago, planted with rows of Pear trees, but from time to time, for various causes, a good many trees have been cut out, so that now there is abundant sunlight, though many of the trees have been replaced, which will necessitate more thinning soon. A few Cherry trees, too, have been planted here and bear well.

The vinery is next beyond, and is perhaps on the highest part of the land, a range running east and west with a rose house at the east end and a cool greenhouse at the west. Sheds and a "north

house" are connected at the rear. A hedge of Norway Spruce beyond, protects cold pits and frames and a summer chrysanthemum shelter, and serves too, to conceal the ash-pile, and also the loam, etc., for the potting shed.

Extending back from this hedge is a grove, open enough to yield some grass. A road leads down through the centre. The trees, some old, but the greatest number planted twenty years ago or less, are in great variety, largely North American, and the collection is constantly being added to, the older trees being cut out, and serving to supply the house with firewood.

Below are two grazing fields, which extend to the salt marsh.

It may be mentioned in closing this account that there is a nursery of young trees and shrubs, into which new acquisitions are generally put before planting out permanently.

Vineyard and Plum Orchard of George B. Andrews, Fitchburg.

The Committee next visited these grounds, concerning which Mr. Andrews wrote as follows:

Twenty-two years ago I entered the field as a grape grower. We were, at that time, following the practice of most of the farmers of our neighborhood, growing corn and potatoes. This brought but very little money into the house, for with the exception of the sale of a few potatoes and what butter was made, there was nothing to sell. So I was determined to set grapes, and get out of the old ruts if I had to break the wheels in so doing.

One of the most important things in grape growing is a favorable location. Especially does this hold true with us here in northern Massachusetts, where, under the most favorable conditions, we need every hour's sun during the season for the growth and ripening of our best hardy out-door grapes. To accomplish this let us select some warm, southeast slope. We should not get too near the bottom of the hill, as I have seen done in many cases, as the danger there is that we may be cut a week or more short in the season by an early frost, which, had we been located a hundred or even fifty feet higher up the hill, might have been avoided, and the crop thereby have been saved. Neither is it a good plan to place a vineyard at the top of a hill, for the exposure to the winds damages a large portion of the fruit during the last stages of

ripening. And above all things we must have good drainage, and avoid having the vines near stagnant water. While the vine grows, and in an ordinarily wet season ripens its crop on very light, sandy land, yet the fruit produced has not as good a flavor for the table, and does not make as good a wine as when grown on heavier soil; but we must avoid too heavy soil, or we shall retard the ripening.

My location, Pearl Hill, is situated two miles north of the city of Fitchburg; the hill at its base is about three and a half miles long by one and a half wide. Leaving the city by the way of North street, when you are scarcely out of its smoke the hill looms up before you. On a gentle southeast slope, protected on the north and west by a ledge of rocks, rising one hundred and fifty feet above it, the vineyard where I have spent the greater part of my time for the past twenty years is located. The soil, we find a good loam, with a hardpan bottom. The ledge is constantly decomposing, and is brought by the storms and melting snows down the steep hillside to this field, and we think adds no little to the fertility of the land. Having selected the spot, let us now prepare the land. I would prefer a good sod, after the grass has been cut; let it be plowed not less than six or more than eight inches deep; then see to it that it is harrowed until it is all cut to pieces; during the fall, winter, or early spring, apply twenty cart loads of cow manure to the acre. As soon as the land is dry enough to work in the spring start the harrow again, and when your field is in good condition to plant to corn it is all right to plant to grapes. But first let us mark it out. We must have decided before this what method we wish to follow, and how far apart we wish the rows and vines, for the viticulturist cannot change his method of training every season, but he must adopt some system and follow it for a number of years, until he is convinced that it is the one best adapted to his wants; or if, on the other hand, it should not prove satisfactory to him, he must gradually change to some other system, and he must ever be looking out for next year's growth of wood, and the proper ripening of the same, for on the proper development of this depends mainly the success of the next year's crop. And often in the trimming of a vine he must look ahead three years, in order to make a cane grow from the right place on the old vine, thereby again proving the necessity of the close attention of the vine

grower. And no doubt it is this close attention necessary to give the best results, that makes the vine so prominent among horticulturists today. I will not take time to describe to you the many different ways of growing grapes as practised today in this country, but simply tell you what I am doing. The first grapes I set were put six feet by ten, and the trellis ran east and west. This, at that time, was contrary to the views of most of the grape growers, who favored north and south as the proper direction in which to run the trellis, but since that time there has quite a change taken place in the minds of many of our prominent grape growers, many claiming that where the trellis is run east and west the vines and soil get the benefit of the sun's rays during the fore part of the day, and that in the afternoon, as it declines, the ground is not shaded by a north and south trellis, and thus gets the full benefit of the sun. But be this as it may, our experience leads us to say that it is not best to adopt any set rule, that drainage is of the most importance, and that it is best to run the trellis so that it will assist in the rapid drainage of all surface water. After ten or twelve years I thought I could not afford so much room for these vines, and put a row in each space between the trellises, so that they now stand six feet by five and have always given us as fine grapes as any we have grown; but we feed them higher than where they are planted farther apart. While the most of my vines are planted seven feet by six, I would now plant eight feet by six, as eight feet is none too much to work in. Let us now stake off our ground,—being provided with as many good stakes, four or five feet long, as we intend to set vines. We go to one corner of the field and set the first stake where we wish to have the first vine in the first row; then we establish the opposite corner, having measured off eight feet for each row; the other end of the field is next staked in the same way. Now we are ready for the six-foot measure, and with that and a man at the end of the row to see that they are set straight, the stakes are put through the row, and when you are done you have a field of stakes, each stake just where you wish to have a grapevine, eight by six feet apart. We are now ready to set the vines, a much easier task than it was to set the stakes. But here arises a very serious question: what varieties shall we set? As few as possible; many a man has learned this too late. We are confined to three, the Concord, Worden, and Delaware; if it would succeed well on our soil we

might add Moore's Early, but it has never done well in our trial row.

Having secured from some reliable nurseryman good No. 1 one-year-old vines, the question arises, how they shall be prepared for setting: they should have roots from two to three feet long. For the strong growing kinds, like the Concord and Worden, I would take a cutting, but for the weaker kinds, like the Delaware, I would prefer a layer. Being all ready, we take a bundle of one hundred vines in one hand, a sharp axe in the other, and with a few blows cut off all but one foot of the roots, and about two-thirds of the top. Sprinkle them well, and see that they are covered up from the dry winds, for it takes but a short time for the sun and wind to take out all the moisture there is in a vine. We now take a pail, fill it about one-third full of cow manure from the stable, and then add water enough to fill it; after stirring this thoroughly, we are ready for the field. Arriving there, I put about twenty-five vines into the pail, the man removes a spadeful or so of earth from the south side of the stake, and I take a vine from the pail, set it in the hole about five inches deep and up to the south side of the stake; he fills the hole, and we move on until the field is set; when done every vine will be just six by eight feet apart.

During the summer see that the growing shoots are kept tied to the stake, and the ground well pulverized; this is nicely done with a one-horse Acme harrow. After the foliage has dropped in the fall cut away all the summer's growth, with the exception of about three inches of the strongest shoot. The next summer keep the growing shoots well tied up to prevent their being broken off, and thus checking root growth; for it must be borne in mind that the first two years are given up to the growing of roots, not top, as they are our bank account which, in future years, we are to draw upon. This has been one of the points that has given me the most trouble during my twenty years as a grape grower,— the equal balance of top and root. In the fall trim away all the wood made this year, with the exception of the strongest shoot, which we will leave about one foot long.

The next spring we are ready for the trellis. We use round, split, or quartered chestnut posts, eight feet long; if cut in June they will peel very readily; piled up crosswise they season well during the summer, and are in good condition to set in the spring. We draw them to the vineyard in the winter, and put them in

small piles around the field. In the spring the posts are set two and a half feet deep and twelve feet apart; should you use small sawed posts they should be set six feet apart. We set the end posts, then draw a line, and set the rest to the line; in this way we not only get the row of posts straight, which is of great value in cultivating, but we get every vine directly under the wire; the end posts are braced. The wire used is No. 15, and we have four to a trellis, the bottom one being twenty inches from the ground and the top one a few inches from the top of the posts; for staples we use short wire nails, driven into the post one below and one above the wire, in the shape of an X.

The trellis being in position, we are now ready to grow our first bearing cane. Several buds will start; remove all of these except two or three of the strongest. When the best of these has reached the lower wire, and been securely tied, rub off the rest. We will grow the first vine up to the second wire, and out on that wire six feet; then we will pinch the end. The next vine we will grow to the top wire, and out on that six feet, when we will stop it. If from any cause a vine shows signs of weakness, it should be stopped; this is done by pinching the end of the vine. In the fall, if it does not look strong, cut it back to the lower wire, and give it a chance to grow more roots. During the summer, laterals will start out along the growing vine; these should be pinched back to one leaf. In the fall there will be no trimming but to cut these laterals back to the main vine.

Up to this time we have been growing roots and a bearing cane; now we are ready to add fruit, and we shall find it necessary to keep both eyes on the gun. When the buds start the next spring, take the first strongest shoot and bend it down to the lowest wire in an opposite direction to that in which it grew last year, and run it along this wire until it reaches the next vine, when it should be nipped; the next vine, which you remember is running on the fourth wire, you treat the same, with the exception of bringing the growing shoot to the third wire instead of the first. These are your bearing canes for next year. Now the remainder of your bearing cane will start from twelve to sixteen buds; these should be allowed to grow until they show six leaves, then they should be pinched in; the laterals will start two or three times during the summer, and must be pinched back to one leaf each time. These shoots are allowed to hang during the season without being tied, and the vine is allowed to carry about five pounds of grapes. The

winter trimming is very simple, and is done with one cut of the pruning shears, by removing the bearing cane from the old vine at its junction with the new cane.

This method of trimming is kept up for six or eight years; then we think the vine is strong enough to carry more fruit. But to do this we must have more leaves, for it requires just so many leaves to grow a pound of fruit; what that number is I have never been able to find out, but Nature knows, and she will have her way; try to over-fruit the vine and she will assert her rights by giving you poor fruit, for it must be remembered that the law of Nature holds as true in the vegetable kingdom as in the animal, and that her object in the growing of fruit is not to tickle the palate, but to grow seeds, and thereby carry out one of the great laws of Nature, that of reproduction. But man does not care for this abundance of seeds; he would have larger fruit, more pulp, and better flavor. To do this we must work in harmony with Nature, and while we find that she cannot be cheated in her slightest wish, yet with careful tact and skillful management she can be made to respond to your bidding, and instead of two or three bushels of small, ill-flavored grapes, we shall have a few pounds of large, choice grapes. This is accomplished by the severe trimming that we have described, and by a system of thinning the fruit. You must first determine how many pounds of grapes you think your vine is capable of carrying, and then cut down to that number, or what you think will make that amount when ripe. This requires no little practice. I have thinned a vineyard of two and one-half acres to carry ten tons; when they were picked they overran five hundred pounds. I count up the bunches on a vine, then tell by the size of the bunches how many I wish to leave, and cut off the rest. In some cases I have removed as many as forty bunches from one vine. To secure more leaves we grow two arms instead of one, running them on the same wires in opposite directions, and treating them the same in every respect; only we have two canes to grow in the summer, and two to trim off in the fall. This is the method followed by us at the present time, with the strong-growing native grapes. In the case of the Delaware it is somewhat different; here we intend to grow four arms, two on the upper and two on the second wire, three feet long. As the canes of the Delaware are shorter jointed than those of the Concord, Worden, or in fact any of the Labrusca

seedlings with which we are acquainted, it becomes necessary, in order to secure the proper amount of foliage, to leave the canes longer before pinching,— say as many as nine leaves to a shoot.

Insects and Diseases. The grape is subject to many enemies, both of the animal and vegetable kingdom. Let us first look at those of the animal. In the early spring, when the bud begins to swell, and before the first tiny leaf unfolds, the advance guard appears and throws out its picket line; they begin operations by boring a small hole into the bud and eating out the centre. When it has devoured all that is palatable it goes to the next, and it is not uncommon to find a vine with every bud eaten. The little fellow who does this is about three-sixteenths of an inch in length, and is of a steel-blue color. We know of no remedy but to kill with thumb and finger. The Rose-bug, or Rose-chafer, makes its appearance about the time the grapes blossom, and in a few days they have been known to destroy large vineyards. Our method of destroying them is to go over the vines and kill the bugs with thumb and finger; they are usually thickest next to the grass land, as that is a good place for them to lay their eggs. The Agricultural College recommends spraying at this time with one-fourth of a pound of Paris green to fifty gallons of water; or, if you use the Bordeaux mixture, put the Paris green into that. Then we have the grape-vine caterpillar, about one and one-half inches long, but I have never heard of their appearing in numbers large enough to do any great harm. During the summer, there may be found on the under side of the leaf, at certain times, a small brown slug; they are hatched from the eggs of the steel-blue beetle which made its appearance early in the spring. The thrip, which is so troublesome when the grape is grown under glass, will, in extremely dry weather, appear in large numbers upon the out-door grape, and while we do not consider it a dangerous enemy, yet it does not add to the strength of the vine, and we welcome a good shower, as this will keep it in check. These, with the addition of the grape-berry moth, of which we have as yet seen but very little, comprise about all the insects that have been troublesome in my vineyard, unless we mention the Phylloxera, which is at work on the roots of nearly all grape vines; but our native grape, as a rule, is such a strong grower that these insects do but little damage if the vine is kept in a good healthy growth; this in fact has much to do in assisting it to withstand the attacks of the different fungi which of late years have been

such a terror to the grape grower. My attention was first called to the Phylloxera some eight years ago, on the receipt of six hundred Worden grape vines from T. S. Hubbard, of Fredonia, N. Y. — the roots were one complete mass of galls. He wrote me that it was not uncommon, and that the vine was such a strong grower that I should derive no harm from them; and yet it adds one more to the already too long list of insect pests.

Fungous Diseases. Here we have an entirely different order of foes. Instead of animal preying upon vegetable, we have plant attacking plant, or parasites living upon their hosts. Those most common to the grape vine in New England are Peronospora and Anthracnose. In my limited experience with these, and the little that I have been able to learn concerning them, I would gladly pass them by, but I should not then be giving you my full experience, for in the past four years I have lost more by fungous diseases than from all other causes since I commenced to grow the vine. Five years ago I commenced to spray the vines, using that year ammoniacal carbonate of copper, as directed by the Department at Washington, but I did not understand what I was trying to do. I simply knew that I had Peronospora on the Delaware vines, and that they recommended spraying. I sprayed twice during the season, but the leaves nearly all dropped in August. For the past two years I have been at work under the direction of Professor Maynard, of our Agricultural College, whose timely words of advice have been of great value in assisting me to battle with these parasites; and while we are not satisfied with results, we yet feel that we are working in the right direction, and trust that ere long science will give us a remedy for these parasites that shall be as effective as Paris green has been for the insect pest. But we must not stop with spraying. I think that the leaves from the vines, and the fields joining the vineyard, should be burnt over, thus destroying the winter spores; the posts, braces, and vines should be washed early in the spring with a strong solution of sulphate of copper, or Bordeaux mixture of full strength. And yet we feel that we know but little of these fungous diseases, except that they are increasing at an alarmingly rapid rate, and that we must ever be on the alert, with our faces turned to the foe.

As evidence of Mr. Andrews' successful culture of the grape, his exhibits of the last three years are probably still in your

minds. Without a doubt no better Delawares were ever shown here. Professor Maynard "never saw such Delawares;" and Messrs. Winn, Ricker, & Co., informed us that the fruit was all engaged before it reached the market. The same was true of the very excellent Worden grapes grown at this place. The Committee take pleasure in reporting to you that it was the best Delaware vineyard they ever inspected, and they are glad Mr. Andrews has met with the success he so well deserves.

Plum Orchard.

In planting plum trees in this section of the country the work should be done in the early spring — never in the fall; and we prefer a two-year-old tree, with roots and top well trimmed back. As the plum lives to a good old age, say twenty-five years, the trees must not be set too near together, but each should have from fourteen to eighteen feet of space. An acre of plum trees set fourteen feet each way, will contain two hundred and twenty trees; at sixteen feet, one hundred and seventy trees; and at eighteen feet, one hundred and thirty-five trees. The last named distance is that at which the plum orchards are set in Western New York; and also those on the banks of the Hudson. There are some very large plum orchards in New York State; among them is that of the Maxwell Brothers, at Geneva, which covers eighty acres. Of this orchard Mr. Maxwell says the trees are sprayed three or four times each season for leaf blight; and the curculios are caught on sheets carried on wheelbarrow-like frames. He claimed that good results in combatting leaf blight were obtained by spraying with modified Eau Celeste, to which soap is added, to cause it to spread easily, and also to adhere to the foliage. Eau Celeste, or blue water, is made by dissolving one pound of sulphate of copper in three or four gallons of warm water, and when the solution has cooled, adding one pint of ammonia, and then diluting to twenty-two gallons. The modified formula is not so apt to injure the foliage, and is made as follows: sulphate of copper, two pounds; carbonate of soda, two and one-half pounds; ammonia, one and one-half pints; water, twenty-two gallons. Dissolve the sulphate of copper in two gallons of hot water; in another vessel dissolve the carbonate of soda; mix the two, and when all chemical reaction has ceased, add the ammonia; finally dilute to twenty-two gallons.

The chief enemies of the plum are the curculio, the borer, leaf-blight, and black-knot; and the man who cultivates thoroughly, prunes understandingly, and keeps his orchard free from insects and diseases, will be the one to carry plums to market. The first two pests, the curculio and the borer, are of the animal kingdom, while the last two, leaf-blight and black-knot,— and we might add the rotting of the fruit — are of vegetable growth. The curculio, the great pest of the plum grower, commences its work on the Bartlett and Angouleme pears, and often spoils the crop for market. It then goes to the cherry and plum as soon as the petals of their blossoms drop, preferring these fruits with smooth skins, and commences its work by puncturing the fruit with its strong beak or trunk, forming a crescent, and just above this cut the egg is deposited. They are slow workers, taking about twenty minutes to each plum. They work for about ten days, but do not work if it is stormy. Paris green has been recommended as a remedy by some of the professors, while others say that the only remedy is by jarring, which is done, after placing a sheet under the tree, by striking with a hammer a sharp blow on the stump of a limb that has been sawed off for the purpose, or upon a nail driven into the tree; this will cause the curculios to let go their hold and drop to the sheet, from which they can be gathered and killed. President Barry, of the Western New York Horticultural Society, says that the spraying of the plum and peach with Paris green for the curculio cannot be depended upon with the same certainty as the jarring process. The borer must be dug out with knife and wire.

The black-knot is a fungous disease, and is said to be kept down by the use of sulphate of copper, or Bordeaux mixture. We use both, yet we do not rely wholly on them, but use the knife. All black knots should be cut out and burned. All wild cherry trees that are generating this fungous growth, are breeding beds for the spores, and should be cut down and burned, whether along the roadside, by any cross wall, or wherever they exist.

As to the fungus that causes the rotting of the plum, Professor Maynard, of the Agricultural College, recommends the use of sulphate of copper in the proportion of one pound to sixteen hundred gallons of water; or the ammoniacal carbonate of copper, which is made by dissolving six ounces of copper carbonate in three pints of liquid ammonia, and diluting to twenty-five gallons

with water. Paris green must not be used with this, as the ammonia dissolves the arsenic and the resulting compound burns the foliage.

The formula for Bordeaux mixture is six pounds of sulphate of copper, and four pounds of lime in fifty gallons of water.

Mr. Andrews further states that his plum orchard has been planted seven years; it is located on a hill which originally was well covered with loam, upon a hardpan subsoil. The loam has been nearly all washed away, and the trees are growing in the subsoil. They have not been unfavorably affected by the dry weather; the foliage is of a dark green color and the fruit does not drop. The trees have been sprayed for three years past with Bordeaux mixture and carbonate of copper. This year they were sprayed five times, and carried about two bushels of fruit to each tree. The varieties grown are Bradshaw, Lombard, McLaughlin, and Washington. Mr. Andrews says the crop sold well and the results were very satisfactory. Your Committee were unanimous in their decision, that this was the most successfully cultivated plum orchard that they have been invited to examine.

CHRYSANTHEMUMS.

As might have been expected, we had some entries for the prizes offered for this popular flower. For the Best House of Chrysanthemums Arranged for Effect with other Plants, the competitors were: Nathaniel T. Kidder, William Martin, gardener; and Walter Hunnewell, T. D. Hatfield, gardener. For the best House of Chrysanthemums grown on Benches the competitors were the Waban Rose Conservatories, Alexander Montgomery, gardener; and William Nicholson. The Bussey Institution, Charles Jackson Dawson, gardener, entered a house of field-grown plants, but not in competition for any prize.

We have the pleasure of presenting statements from all these places.

Nathaniel T. Kidder's Chrysanthemum House, Milton.

The Greenhouse that was entered for the premium for the Best House of Chrysanthemums arranged for effect with other plants, is fifty-two feet long and twenty feet wide, and is a three-quarter span.

There were two side benches, and a centre stage of two tiers. In the house there were twenty-seven large specimen plants, and twenty smaller ones; also a large number in seven-inch and eight-inch pots, with from three to five blooms on each plant. On the back bench were some Camellias, Habrothamnuses, Ericas, and Epacrises; and between these were the large blooms of Chrysanthemums.

On the centre stage and the front bench were the specimen plants, and interspersed between them were plants of *Nephrolepis exaltata plumosa*, with their foliage hanging over the sides of the benches.

The culture of the plants is similar to that of other growers, with the exception of syringing. After their final shift no water is allowed to touch the foliage, except when they are syringed with a decoction of whale oil soap and tobacco water once in ten days to keep down insects.

The following varieties were some of the best:

C. B. Whitnall,
Clinton Chalfant,
Col. W. B. Smith,
Cullingfordii,
Duchess of Connaught,
Edward Hatch,
Edwin Lonsdale,
Ernest Asmus,
George W. Childs,
Gloriana,
Improved Bœhmer,
Ivory,
J. C. Vaughan,
Joseph H. White,
L. Canning,
Madame Marie Hoste,
Mattie C. Stewart,
Miss Minnie Wanamaker,
President Hyde,
Princess of Japan,
Superbæflora,
The Queen,
Val d'Andorre,
Viviand Morel,

W. H. Lincoln.

Walter Hunnewell's Chrysanthemum House, Wellesley.

This contained twenty-three plants. The varieties were:

Achilles.— Blush white; dwarf, rather late.

A. H. Fewkes.— Yellow; dwarf, a bushy even grower, good foliage to the ground.

Arethusa.— Bright pink; dwarf, early.

C. B. Whitnall.— Deep purple; incurved, late.

Columbine.— Bronze; early, dwarf.

Eda Prass.— Delicate salmon; late, medium height.

George W. Childs.— Deep velvety crimson; large, well-formed flowers of great substance; very fine.

George Hawkins.— Yellow; Anemone.

Golden Hair.— Novelty, 1894, E. A. Wood.

Iora.— Shell pink; early, medium height.

Ivory.— Pure white; Chinese incurved, flowers large, full, and fine, round shape.

Louis Bœhmer.— "The pink Ostrich Plume." A beautiful delicate silvery pink; a variety of great merit, the flowers are large, and it is a very free-blooming variety.

Louis Bœhmer, "White."— Pure white; very free blooming. A sport from Louis Bœhmer.

Miss Minnie Wanamaker.— White; late, medium height.

Mrs. E. B. Freeman.— Yellow; ostrich; sport from Louis Bœhmer.

Portia.— Pink; medium early, moderate height.

Primula.— Yellow; seedling from Empress of Japan.

Summit.— Incurved Chinese; novelty of 1893.

Tuxedo.— Deep orange; tall, late.

Vernal Fall.— Feathery white; early, dwarf.

Walter Hunnewell.— Orange; medium height, mid-season.

White Cap.— White; dwarf; late; Incurved Japanese.

W. H. Lincoln.— Beautiful soft yellow; large, perfect form; vigorous grower; Japanese.

Mr. Hatfield remarks that of these varieties he will probably discard several, and grow others which he considers better adapted to his purposes. He states as his reasons that C. B. Whitnall is too late; Tuxedo is too tall and late; Eda Prass is too late and scarcely bright enough pink, when there are better; Vernal Fall is too delicate to rely upon; Miss Minnie Wanamaker is too late and takes too long to open, being too double.

As to methods of culture, Mr. Hatfield says there is nothing new, unless it may be that less stimulants were used than last year, and with improved results,— better plants, better and brighter blooms, and cleaner and better foliage. He thinks the probability is, that growers are very liable to be too liberal with stimulants. Close attention is the watchword.

The small house in which were growing a good number of plants

with single stems, and which contained many good blooms, is in reality a vegetable house, but is used in summer for a few cut-bloom varieties. If not as well adapted for the purpose as could be desired, it does quite well, and affords a good opportunity to test novelties and grow some seedlings.

As a grower, the best evidence of Mr. Hatfield's skill is the fact that for six years in succession, his plants have received the first prize at the Annual Exhibitions.

Waban Rose Conservatories, Natick.

The Committee visited this place while the chrysanthemums were in bloom, and at their request, Mr. Alexander Montgomery, the gardener, has given the following notes on some of the newer varieties of Chrysanthemums:

Among the many brought out this year are the following: Eugene Dailledouze, H. L. Sunderbruch, Major Bonnaffon, Mutual Friend, Inter-ocean, Wanlass, Mrs. J. G. Ils, etc. A gratifying point about the new varieties this year is that many of them are good either for exhibition or market purposes.

We grow about eight thousand plants, mostly to specimen flowers, and find them fairly profitable; probably more dollars are realized from the square foot of this crop than would be from smaller flowers; but were many others taking in the same quality of flowers there would hardly be a market for them. Still, as an advertisement for the smaller flowers, they are indispensable, as chrysanthemums would never command the public attention they do were it not for the fine large flowers. A small flower of Eugene Dailledouze, or Mrs. Jerome Jones, would never attract special attention, but see them in their glory and the veriest rustic, and the most learned professor, will alike take off their hats and stand enraptured before them. Therefore, I say, we must have a proportion of the very finest flowers that can be grown: and our hybridizers have yet great room for improvement. We have size enough. Attention must now be given to finish; bright, clear colors — the ideal pink has yet to be presented—and size without coarseness. I predict that the next few years will see still greater improvement than heretofore, both in varieties and their cultivation, and the man who now "knows it all" will then stand amazed to find himself such a Rip Van Winkle in this march of progress.

Mr. Montgomery recommends the following twenty-four varieties for the market:

Arthur H. Fewkes,
Col. W. B. Smith,
Cullingfordii,
Ermenilda,
Eugene Dailledouze,
Golden Wedding,
H. L. Sunderbruch,
Inter-ocean,
Ivory,
John Shrimpton,
Lady Playfair,
Major Bonnaffon,
Maud Dean,
Mrs. Craig Lippincott,
Mrs. E. G. Hill,
Mrs. Jerome Jones,
Mrs. Phipps,
Mrs. R. Bergmann,
Mutual Friend,
Niveus,
President Smith,
Queen,
Viviand Morel,
W. H. Lincoln.

WILLIAM NICHOLSON'S PLEASANT HILL CONSERVATORIES.

FRAMINGHAM, November 12, 1894.

JOHN G. BARKER, Jamaica Plain.

Dear Sir:—In reply to your letter of inquiry in regard to my mode of growing Chrysanthemums, I will say that the house in which I grow them is fifteen feet by one hundred feet. They are all grown on benches in five inches of loam. The loam I prepare in the fall before, by plowing grass land five inches deep, and carting the sods to a pile, and mixing five loads of sods with one load of good horse manure; also putting on each layer ten quarts of bone flour.

The house is run to Tomatoes till July 15 to 20, when we empty out all the old loam, put in the new soil, and plant the Chrysanthemums that were struck the last of May and the first of June, and had been grown in two and one-half inch pots, till planted on the benches. They are planted six inches apart each way, and when they begin to show bud I feed them with cow manure water, and put on a light mulching of old manure. As soon as the buds begin to show color we stop the manure water and finish with a little sulphate of ammonia. We grow them quite cool in the fall, leaving ventilators open all night all the time, with a little fire heat to keep away mildew. This house has about thirty-five hundred plants in it, all grown with a single stem and one flower to a stem

for market. We follow the Chrysanthemums with Lilies and Tomatoes.

I have two Carnation houses; one is one hundred feet by twenty feet; the other is one hundred and fifty feet by twenty feet, with about six thousand Carnations planted in them, which are looking very well. I have one house one hundred feet by twenty feet for Roses; two small Fern houses; also one house sixty feet by ten feet for Violets and other plants; and one house sixty by fifteen feet for miscellaneous stock; in all a little over fourteen thousand square feet of glass, which is heated by two Furman boilers with hot water under pressure, partly overhead and the rest under the benches, in one and one-half and two-inch pipes The glass used is sixteen by twenty-four inches in most of the houses.

My soil is rather sandy; just right for Carnations, but light for Roses.

I should be very much pleased to have you look over my place any time you could make it convenient.

Yours respectfully,

Wm. Nicholson.

Bussey Institution, Jamaica Plain.

Dear Mr. Barker:—In answer to your inquiry as to the method of culture of Chrysanthemums at the Bussey Institution, I would say: The cuttings were struck from the middle of March to the middle of May, and when rooted were potted in three-inch or four-inch pots. In the early part of June they were planted out of doors in the field, where the ground had been used for the same purpose for a number of years, after being well manured in the spring. Pinching was practised from time to time, up to the first of August. About the middle of August they were lifted and potted in their flowering pots—seven-inch to eleven-inch. The soil was made fairly rich, being composed of equal parts of rotted manure, sod, and sand, with a small portion of leaf mould, and a small quantity of bone meal. The potting was of medium firmness, experience teaching us that too firm potting for a Chrysanthemum is not to be advocated.

After potting the plants were placed in a frame-yard, where they were sheltered from strong winds. Frequent syringing was practised on bright days, until the plants became established, it

being necessary at first to syringe as many as five or six times a day, in order to keep the plants from wilting too much. About the middle of September they were placed in the house, and given as much ventilation as possible night and day. Liquid cow manure was used about twice a week, and nitrate of soda in a very weak state once a week, with but one or two exceptions. Staking was not practised, all the plants growing in a natural way.

Among varieties which did well were:

Joseph H. White, white.
Ivory, "
L. Canning, "
Diana, "
Niveus, "
Mabel Simpkins, "
Puritan, "
Theo, white; a seedling, raised the year before last, and found to make a remarkable pot plant.
Thistle, lemon yellow and white.
President Hyde, yellow.
Neesima, "
Golden Wedding, "
A. H. Fewkes, "
E. G. Hill, "
Mabel Ward, "
Walter Hunnewell, "
Golden Gate, yellow.
W. H. Lincoln, "
Col. C. R. Smith, "
Mr. Astie, yellow pompon.
Hicks Arnold, bronze yellow.
Eda Prass, delicate salmon.
Jeanne d'Arc, pinkish white.
Louis Bœhmer, silvery pink.
Duchess of Connaught, pink.
Viviand Morel, "
Pres. W. R. Smith, "
V. H. Hallock, "
Waban, "
Mrs. J. N. Girard, silvery rose.
George W. Childs, red.
Cullingfordii, "
Miss Fairbanks, "
John Thorpe, magenta.

Charles Jackson Dawson.

The Committee have made the following awards:

Prizes.

H. H. Hunnewell Triennial Premium.

For an estate of not less than three acres, which shall be laid out with the most taste, planted most judiciously, and kept in the best order for three consecutive years, to Nathaniel T. Kidder, Milton, a prize of . . $160 00

Society's Prizes.

For the best house of Chrysanthemums, arranged for effect, with other plants, to Nathaniel T. Kidder, Milton	$50 00
For the second best to T. D. Hatfield, gardener to Walter Hunnewell, Wellesley	30 00
For the best house or houses of Chrysanthemums, grown on benches, to Waban Rose Conservatories, Natick	50 00
For the second best to William Nicholson, Framingham	30 00

Gratuities.

To Francis Brown Hayes, Lexington, for successful culture of Rhododendrons	45 00
To William C. Strong, for successful cultivation of Small Fruits	30 00
To George B. Andrews, for a very successfully cultivated Delaware Grape vineyard	45 00
To the same, for a successfully cultivated Plum Orchard	45 00
To Lawrence Cotter, gardener to C. V. Whitten, for a very fine bench of Chrysanthemum Ivory	30 00
To Charles J. Dawson, for a house of Chrysanthemum plants grown under field culture	30 00

Amount appropriated	$500 00
Amount awarded	385 00
Balance unexpended	$115 00

Approved at a meeting of the Committee December 22, 1894.

John G. Barker, *Chairman.*
E. W. Wood,
C. N. Brackett,
Jackson Dawson,
Henry W. Wilson.

REPORT

OF THE

Committee on School Gardens and Children's Herbariums.

FOR THE YEAR 1894.

By HENRY L. CLAPP.

At the Exhibition of Children's Herbariums, November 30 and December 1, 1894, there were fifty exhibitors; fifteen collections of flowers, numbering 256 specimens; fourteen collections of ferns, numbering 129 specimens; two collections of grasses, numbering 70 specimens; twenty-six collections of leaves, numbering 865 sheets, and of all kinds 2,020 sheets.

Some of these collections were notable. Arthur C. Faxon's collection of 190 sheets of leaves, was remarkable for its size and completeness, It contained finely mounted sprays of leaves of 100 native trees and 90 introduced trees. His collection of 50 grasses was probably the best ever exhibited in Horticultural Hall.

Two collections of flowers, sent by Lucy B. Foster and Emily L. Ames, were remarkable for the skill manifested in pressing and mounting the specimens. The specimens themselves were large and well arranged on the sheets, and the natural colors had been kept to a remarkable degree. Children can study such collections with more than usual profit. On the whole there has been satisfactory improvement in pressing and mounting the plants. Those who have exhibited before have, in most cases, made marked progress. Many who exhibit for the first time, hardly know what neat and beautiful work is. Unfortunately too many exhibitors cannot visit the exhibition at all, to learn from seeing the fine collections always to be found there. Nice work does not consist in covering the under-surface of leaves with glue, or in bandaging down a plant as the Lilliputians bound down Gulliver.

Among the ferns exhibited were two new species from New England, *Aspidium cristatum marginale* Davenport, and *Aspidium simulatum* Davenport, described and named by Mr. George E. Davenport of this Committee.

Arthur E. French's collection of ferns was a fine one. The fronds were complete, even, well arranged, and correctly named. Such a collection gives proof of knowledge of the plants [illegible]

ERRATA.

Page 339, line 2, "*Aspidium cristatum marginale*" Davenport, should be *Aspidium cristatum*×*marginale* Davenport.

Page 341, lines 6 and 7 from the bottom, "*Aspidium spinulosum*, type and var. *Boottii*," should be *Aspidium spinulosum* and *Aspidium Boottii*.

Page 347, line 3, "Malden" should be Medford.

[illegible] done by any other institution in the State.

However that may be, we have a reasonable assurance that in the course of time, by means of this work, many people will have—what the public schools do not aim to teach—a delightful, innocent, and elevating recreation to which they can turn for recuperation and refreshment during the leisure hours from their regular vocations, and also after those vocations have been laid aside in the later years of life. One important aim of education should be, to teach the young to make wise provision for the leisure part of life,

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Arthur E. French's collection of ferns was a fine one. The fronds were complete, even, well arranged, and correctly named. Such a collection gives proof of knowledge of the plants, and of the work necessary for their preparation. It pays children to do it.

The growth of the work cannot escape the notice of any observer. Both halls were completely occupied. The number of specimens has risen from 1,100 last year, to 2,000 this year. The range of contributors is increasing, Billerica, North Easton, Sudbury, and Holyoke, in this State, and New Haven, Conn., having been laid under contribution.

The children cling to the work year after year. Arthur C. Faxon contributed this year for the third time. Phillips Barry also contributed this year for the third time, and his contribution was accompanied by the following label: "List of twenty-five additions of Flowering Plants to a collection awarded a First Prize December 26, 1891, to which fifty additions were made in 1893."

Five other children contributed this year for the second time. The rule that specimens once exhibited for prizes cannot be exhibited again, although a proper one, makes it harder and harder for the contributors to find new specimens to exhibit, and, although they do not contribute a third, or even a second time, we cannot reasonably conclude that they have discontinued work, or have lost their interest in it.

It does seem reasonable to conclude that the work carried on under the auspices of this Society is doing more to create among children a love for wild flowers, and plant life in general, than that done by any other institution in the State.

However that may be, we have a reasonable assurance that in the course of time, by means of this work, many people will have—what the public schools do not aim to teach—a delightful, innocent, and elevating recreation to which they can turn for recuperation and refreshment during the leisure hours from their regular vocations, and also after those vocations have been laid aside in the later years of life. One important aim of education should be, to teach the young to make wise provision for the leisure part of life,

which, to the graduate of the ordinary school is frequently full of uncertainty, not to say peril, especially in a city. Given a love for plant life, young people's summer vacations will afford evidence of sanity and not of folly and frivolity; and the delightful summer will all be lived over again in the winter as the specimens are brought out and studied. The number of eminent men in France who make botany an avocation is astonishingly large; and it is fitting that this Society should use its influence, as it is now doing, not only to make the number of such men large in this country, but the number of women also; and this herbarium and school garden work gives good promise of doing just that thing.

The opportunity to see two thousand plants spread out for unrestricted study is not a common one, and should be appreciated by adults interested in plants as well as by children. One visitor was the author and illustrator of that delightful book "Familiar Flowers of Field and Garden." He said it was "a golden opportunity" for him, and remained to the very end, making sketches of the variations of well-known plants.

Professor Hanus, Assistant Professor of Pedagogy at Harvard College, was enthusiastic over the exhibits, which he had not heard of before. He immediately sent over his wife, child, and students from his seminary class.

To make this work thoroughly effective we should have the aid of herbarium specimens, by means of which New England plants may be determined with certainty.

For many years a good deal of money has been expended in the purchase of valuable books on flowers, trees, ferns, grasses, mosses, lichens, fungi, etc. That is a great piece of good fortune. Nevertheless, colored plates cannot fully take the place of real specimens. These beautiful and useful books should be supplemented by herbarium specimens of Massachusetts, at least, and perhaps of New England. What a treasure such a collection of leaf sprays as Master Faxon's would be to one who wished to study the native and introduced trees of Massachusetts! How much Mr. Davenport's collection of ferns in the library is consulted! So it would be with a collection of grasses, sedges, lichens, mosses, orchids, golden-rods, and flowering plants generally, especially those of New England. If additional room is ever made for the library, cannot some small space be provided for a comparatively local herbarium? Wall space of ten feet square would seem to be sufficient.

The many interesting and rare wild plants that are frequently brought here for exhibition and then thrown away could be pressed and saved for continual reference if such a space were provided. Many of the plants that are sent in yearly by children could be secured. They would make our books more serviceable, and on the other hand our books would make the specimens more serviceable. The means of study would be more complete.

Interest in wild plants has been increasing for some years past. Asters have been cross-fertilized. The variety and beauty of asters at some of our recent exhibitions have been remarkable, and the displays of rare and interesting wild plants exhibited by an increased number of persons should suggest to us the idea of furnishing the valuable means of plant study and identification to be found in choice herbarium specimens.

REPORT ON THE GEORGE PUTNAM SCHOOL GARDEN SEASON OF 1894.

The plants named below were introduced into the garden during the season of 1894:

FLOWERING PLANTS.

Aster acuminatus.
" *puniceus* (large variety).
Chelidonium majus.
Clematis Virginiana.
Dalibarda repens.
Epigæa repens.
Gaultheria procumbens.
Hieracium scabrum.
Solidago latifolia.
" *sempervirens.*
" *squarrosa.*
Viola pubescens.

FERNS.

Adiantum pedatum.
Aspidium acrostichoides var. *incisum.*
" *cristatum.*
" *marginale.*
" *spinulosum*, type and var. *Boottii.*
" *spinulosum* var. *intermedium.*
" *Thelypteris.*
Asplenium ebeneum.
" *thelypteroides.*
Botrychium ternatum.
" *ternatum* var. *dissectum.*
" *Virginianum.*
Cystopteris fragilis.
Onoclea sensibilis var. *obtusilobata.*
" *Struthiopteris.*
Osmunda cinnamomea.
Phegopteris Dryopteris.
" *polypodioides.*
Woodsia Ilvensis.

On account of unfavorable soil, or lack of water during the season of 1893, some plants died; among these were *Solidago bicolor*, *S. lanceolata*, *Aster vimineus*, *A. dumosus*, *A. diffusus*, and *A. patens;* all of which have been replaced.

Thus it appears that thirty-eight wild plants were added to the garden during the season of 1894, including twenty ferns, five golden-rods, and six asters; also thirteen other flowering plants, some of which were cultivated.

The chairman of the School Garden Committee made a careful selection of seeds of such cultivated plants as would be serviceable for observation in a school garden. These were planted and resulted in varieties of marigolds, larkspurs, foxgloves, snapdragons, morning-glories, pinks, and martynia, pepper, and egg plants. She also sent a large collection of bulbs (tulip, hyacinth, crocus, etc.), which were planted in November.

In the spring of 1894, a friend sent several hundred plants in pots, which were set around the flag-staff and in a number of beds, and these plants made a fine display till frost came.

Last fall, B. T. Newman, the Fryeburg (Maine) artist, sent from Maine, to this school, a number of wild plants of varieties that had not been in the garden before.

A few hardy perennial plants, including phlox, iris, sneezeweed, Frazer's primrose, and California sunflower, have been added.

The eight varieties of hardy chrysanthemums previously introduced have received three additions, and the abundance of their blossoms in October was remarkable, in the opinion of the many visitors who came to see them. The eleven varieties were exhibited at the Annual Chrysanthemum Exhibition of this Society, and for these a gratuity was awarded to the School Garden.

"The Listener" of the "Boston Evening Transcript" mentioned the collection thus: "One thing that well deserved attention and admiration was the collection from the George Putnam School. Those were mostly little fellows, of course—pretty 'Brown Bobs,' 'gold buttons,' and the like; very natural and lovely. The 'Mrs. Seaver,' in this collection, was a lovely white, and a typical chrysanthemum, though small."

Besides these hardy chrysanthemums, and the many wild and cultivated plants mentioned in previous reports, the garden now contains some families of native wild plants, which are represented by a considerable number of species; and among them are fourteen golden-rods, eighteen asters, and twenty-nine ferns.

Most of the ferns were collected in Maine, and contributed to the garden by Miss Katharine W. Huston of this Committee.

By the aid of the boys, a fernery was made last fall in an angle of the north wall of the school-building. They took hand-carts, went into the woods, and collected leaf-mould, which they mixed up thoroughly with loam, and then assisted in taking the ferns from scattered places in the garden, bringing them together, and locating them by genera. The name of each species was written on a flat stick, which was stuck into the ground near the specimen to which the name belonged.

These specimens, added to other species of the same kind in the garden, will furnish material for the study of ferns Many lantern slides of fern fronds have been made, and many more will be made, from negatives which were taken with a hand camera in Maine and Canada, during the summer of 1894. The slides are of three kinds: first, of the reproductive organs of ferns, photographed from plates in books belonging to our library; second, of pressed and mounted fronds of ferns; third, of fern fronds growing in their native homes. This series of slides will be of the greatest service for class instruction during the winter, and will lead to an appreciation of the interesting developments to appear in the fernery and school garden in the coming spring.

The bright anticipations of the fourth season of the garden have been more than realized, and the fifth season is anticipated with no less interest and hopefulness.

Henry L. Clapp,
Principal of the George Putnam School.

REPORT ON THE ROBERT G. SHAW SCHOOL GARDEN, SEASON OF 1894.

This school made its first attempt in the line of school-garden work the past season. The original plan was, in addition to planting the garden vegetables and flowers, to transplant from the fields and woods of West Roxbury and vicinity the ferns, and the more interesting flowers and shrubs, and, in coming years, to introduce from other places such plants as might seem desirable. Owing, however, to the fact that the city is soon to regrade the school grounds, it was thought best not to set out any perennials this year, but to give our chief attention to garden vegetables and annual flowers.

The children entered into the spirit of the enterprise with enthusiasm, and volunteers were not lacking to take hold of any part of the work. Tools were brought, the ground prepared, many seeds and roots supplied, and the planting done by the boys, while two of the girls had their own gardens all to themselves, and displayed much skill in arranging them.

The garden contained: *first*, the cereals—wheat, rye, oats, barley; *second*, seeds of the vegetables—cabbage, turnip, beet, parsnip, carrot, and onion, to show their first year's growth; *third*, the roots of all these vegetables were planted to show their growth of flowers and seeds. Peas and different varieties of beans were planted. Some fifteen or twenty varieties of flower seeds, furnished by the Committee, were also sown.

Six large beds were also prepared in the front yard. The canna bed contained about seventy cannas of different varieties, some of which were given by the people of the vicinity, but most of them were from the Fisher Brothers, of Montvale. The geranium bed contained about fifty plants, most of which were brought by the children. The other beds contained poppies, sunflowers, New England asters, and the annual double asters.

The children watched the growth of these plants with much interest, and had opportunities for studying them in the garden, as well as in their rooms.

The results of this first trial were not what was anticipated, owing, for the most part, to the lack of proper fertilizers, and the dry season. But we are pleased with what was done, and shall expect greater things as soon as we have the grounds graded so that we can carry out our plans.

W. E. C. Rich, *Principal.*

PRIZES AND GRATUITIES AWARDED FOR CHILDREN'S HERBARIUMS.

Flowers.— First prize for one hundred and twenty-five specimens, George E. Nichols $5 00

First prize for one hundred specimens, Lucy B. Foster 4 00

Second prize for one hundred specimens, Ethel F. Wood 3 00

First prize for seventy-five specimens, Nellie D. Lathrop	3 00
First prize for fifty specimens, Willis H. Weinz	2 00
Second prize for fifty specimens, Charles Shrieves	1 50
First prize for twenty-five specimens, Emily L. Ames	1 50
Second prize for twenty-five specimens, Mary B. Field	1 00
Ferns. — First prize for twenty specimens, Arthur E. French	3 00
Second prize for twenty specimens, Kellogg Darland	2 00
First prize for ten specimens, Ethel M. Egan	1 25
Second prize for ten specimens, Amy L. Backup	1 00
Grasses. — First prize for fifty specimens, Arthur C. Faxon	5 00
First prize for twenty specimens, Christine Lewis	2 00
Leaves. — First prize for not less than twenty sheets, of native trees and shrubs, Arthur C. Faxon	2 00
Second prize, Katie A. Dwyer	1 00
Third prize, Wallace A. Gleason	75
Amount of Premiums Awarded	$39 00

Gratuities: —

Lizzie Engel, one hundred and fifty Flowers	$3 00
Edith A. Tower, one hundred "	2 50
E. T. Putnam, fifty "	2 00
Mabel C. Macomber, twenty-five "	1 50
Phillips Barry, twenty-five "	1 00
Nellie S. Morris, twenty-five "	1 00
Jennie Riley, twenty-five "	50
Marion C. Goward, twelve Ferns	75
Mabel C. Macomber, ten "	75
Charles Shrieves, ten "	75
Arthur E. French, thirty-nine sheets of Leaves	75
Ada K. Wood, forty-four " " "	60
Lulie D. Ellis, thirty-four " " "	60
Mary B. Field, thirty-two " " "	60
Wm. A. McCann, twenty-three " " "	50
Ethel M. Egan, twenty-three " " "	50

Mabel C. Macomber, twenty sheets of Leaves		50
John Nichols, twenty-one	" " "	40
Oscar Zapff, twenty-five	" " "	30
Katie O'Leary, twenty	" " "	25
Clara Stiles, twenty	" " "	25
Susie M. Deveney, twenty	" " "	25
George Dillon, twenty-four	" " "	25
Edward Karcher, twenty	" " "	25
William Rae, twenty	" " "	25
Beatrice Grover, twenty	" " "	25
Hattie Borden, twenty	" " "	25
Lena Kern, twenty	" " "	25
Mary E. Kelley, twenty	" " "	25
Alice Aitken, twenty	" " "	25
Charles Eastman, twenty	" " "	25
Nellie S. Morris, twenty	" " "	25
Mary Maloney, twenty	" " "	25
Lucy B. Foster, for special excellence in pressing and mounting		1 00
Emily L. Ames, for special excellence in pressing and mounting		1 00
Amount of Gratuities		$24 00
" " Premiums		39 00
Total Awards for Children's Herbariums		$63 00

PRIZES FOR SCHOOL GARDENS.

George Putnam School, first	$15 00
Robert G. Shaw School, third	10 00
Amount for School Gardens	$25 00
Total Awards	$88 00

The Committee, May 12, 1894, voted to George E. Davenport ten dollars, to begin a garden in connection with a school in Malden, which he visits as a member of the School Committee.

For the Committee,

HENRY L. CLAPP.

MRS. HENRIETTA L. T. WOLCOTT,
HENRY L. CLAPP,
GEORGE E. DAVENPORT,
MRS. P. D. RICHARDS,
MISS KATHERINE W. HUSTON,
WILLIAM P. RICH,
W. E. C. RICH, *Secretary*,

Committee on School Gardens and Children's Herbariums.

REPORT

OF THE

COMMITTEE OF ARRANGEMENTS,

FOR THE YEAR 1894.

By J. H. WOODFORD, Chairman.

This Committee, having charge of the exhibitions during the year, have the pleasure of reporting that they have attended to their duties properly.

The halls have been arranged in such a manner as to best bring into view the various collections at each exhibition, as required by the Schedule of Prizes. It was found quite impossible to procure moss to fill the rose boxes at the Rose Show; therefore the Committee, at a subsequent meeting, voted to recommend to the Committee for establishing Prizes, to arrange the Schedule in such a manner as to do away with the use of boxes at the Rose Show. We are pleased to notice that the new Schedule of Prizes, for 1895, will allow all roses to be shown in the glass vases of the Society, thereby gaining room for a much larger display of the Queen of Flowers, and presenting her in a manner worthy of her royal position.

The receipts for admission to the two shows at which an admission was charged were not as large as last year, which was probably owing to the inclement weather, that prevailed at those times. The amount of money placed at the disposal of this Committee has been expended judiciously and for the best interests of the Society.

It is to be hoped that when a party makes an entry for an exhibition, he will faithfully carry out his proposition; for, in

case of his failure to do so, he unsettles the plans of the Committee in the arrangement of the halls, causing much confusion. The object of our exhibition is to present to the public an acceptable grouping of plants and flowers, which shall be pleasing to the eye in detail, and at the same time be so arranged as to make each hall attractive as a whole. If one entry fails it leaves a gap, and the grouping is thereby rendered incomplete, and the Committee are blamed for want of good taste in their arrangements.

The progress we are making in the noble art of Horticulture will be pointed out by the Chairmen of the other Committees. We have no doubt that we are making progress in the right direction by the production of improved varieties of Fruits, Flowers, and Vegetables.

According to the Treasurer's books the receipts of the Spring Exhibition were .	$206 75	
Chrysanthemum Show	780 00	
		$986 75
Expenses:		
Spring Exhibition	$260 79	
Chrysanthemum Show	315 70	
		576 49
Leaving a balance of		$410 26

which has gone into the treasury of the Society.

All of which is respectfully submitted.

For the Committee,

JOSEPH H. WOODFORD,
Chairman.

REPORT

TO THE

STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1894.

By GEORGE CRUICKSHANKS, of Fitchburg.

The Massachusetts Horticultural Society was organized in 1829, for the promotion and advancement of the art of Horticulture, and well it has performed its mission, as may be seen by the constantly increasing interest in its work.

The Society began the year 1894 with a course of Lectures and Discussions on subjects connected with its work, by the following named gentlemen:

January 13. Fungi, by William C. Sturgis, Ph. D., New Haven, Conn.

January 20. Pruning, by Edwin Hoyt, New Canaan, Conn.

January 27. Hardy Grapes, by Dr. Jabez Fisher, Fitchburg.

February 3. Electricity; the Latest Discoveries as Applied to Horticulture, by L. H. Bailey, Ithaca, N. Y.

February 10. The Construction of Plant Houses, by W. A. Burnham, Irvington-on-Hudson, N. Y.

February 17. Mushrooms, by William Falconer, Glen Cove, New York.

February 24. Cinerarias and Calceolarias, by Kenneth Finlayson, Brookline.

March 3. Some Insects Injurious to Vegetation, by John G. Jack, Jamaica Plain.

March 10. Metropolitan Parks, by Sylvester Baxter, Malden.

March 17. Growing Seeds for the Market, by Hon. James J. H. Gregory, Marblehead.

March 24. Vegetables Under Glass, by William D. Philbrick, Newton Centre.

March 31. Ornamental Horticulture at the World's Columbian Exposition, by William J. Stewart, Winchester.

The Spring Exhibition of the Society began March 28, to continue three days. The weather at that date was not favorable for a good display of choice stove and greenhouse plants, the mercury standing at only twenty degrees above zero. Few growers would assume the risk of exposing their tender specimens to the frosty air. But notwithstanding the exhibition suffered by the absence of some of the choicest plants, the show was excellent in many respects. On the floor of the Lower Hall were tastefully arranged groups of Hydrangeas, Azaleas, Acacias, and Rhododendrons: and on the tables at the sides of the hall, were spread dozens of the Society's dishes containing many varieties of Apples, Pears, Potatoes, String Beans, Mushrooms, Onions, Radishes, Lettuce, Parsley, Rhubarb, and Tomatoes.

On entering the Upper Hall, a scene of beauty and fragrance greeted the visitor. Here was the most brilliant part of the Exhibition. The display of Spring Flowering Bulbs included the fragrant Hyacinths, Tulips, Easter Lilies, Lilies of the Valley, and Cyclamens; these with the numerous varieties of Cinerarias, Primulas, Pansies, Pinks, Roses, and Violets, to which were added several fine specimens of rare Orchids, formed a dazzling and entrancing combination.

The Rose and Strawberry Exhibition began June 20. Notwithstanding the series of extremely hot, dry days which preceded the opening of this display, it was fully equal to any previous one. The Upper Hall was devoted to the Roses, a fine display of Rhododendrons, and large collections of Hardy Herbaceous Plants. The show of Strawberries, in the Lower Hall, surpassed any previous one, both in quantity and quality. The leading varieties were Marshall, Belmont, Sharpless, and Bubach. The Marshall was shown two years ago for the first time. It is a variety of much promise. A few very handsome bunches of Foreign Grapes were exhibited. The show of Vegetables was large and fine, comprising Lettuce, Beets, Carrots, Potatoes, Onions, Radishes, Peas,

Cauliflowers, Asparagus, and Cucumbers. All gave evidence of good culture.

The Annual Exhibition of Plants and Flowers began September 5, and continued two days. The Cut Flowers were shown in the Lower Hall, where large and fine displays were made of Dahlias, Asters, Tuberous Begonias, Marigolds, Zinnias, Phloxes, and large collections of Wild Flowers. The Upper Hall was devoted to pot plants. Interesting collections of Aquatic Plants were shown in large tanks. At the entrance of the upper hall, one tank contained twenty varieties of Nymphæas, or water lilies. One plant of special interest was the Egyptian Papyrus. Among the foliage plants were a fine specimen of the beautiful *Cissus discolor*, Crotons, and Caladiums. The flowers of *Clianthus Dampieri*—the Australian Glory Pea—attracted much attention. Large collections of Dwarf French Cannas were exhibited, and many fine seedlings of this class were shown for the first time.

The Annual Exhibition of Fruits and Vegetables was held October 3 and 4, in the two halls of the Society. The fruits were arranged in the Upper Hall. The dry season was favorable for the best results in our Native Grapes, as was shown in the fine display of Delaware, Worden, Prentiss, Lady Washington, Brighton, Niagara, and Jefferson. The exhibits of Foreign Grapes were good; one superior bunch weighed six and three-quarters pounds. The show of Apples was very large; such varieties as Baldwin, Rhode Island Greening, Hubbardston, and Northern Spy, were of large size and fine specimens. Those of Jacobs Sweet were remarkable for size. The Pears were large and very fine. Forty-three dishes of Bosc were offered for the special and regular prizes. This exhibition of fruits has never been equalled before by this Society. The vegetables were on the tables in the Lower Hall, and they were all of excellent quality.

The Chrysanthemum Show opened November 6, and continued four days. The most striking feature of the exhibition was seen on entering the Lower Hall. It was a semi-circular line of very large Chinese vases, filled with the choicest specimens of the gardener's art in chrysanthemums. They were stately and impressive enough to make one stand in speechless wonder at this triumph of horticultural skill. The Lower Hall was devoted to the cut flowers. There was a grand display of pot plants in the Upper Hall, many plants bearing three hundred blooms each. These plants

had been brought to the highest state of perfection yet reached, and no one could fail to take account of the foliage; the leaves were well developed, having a thickness and firmness like leather, a waxy gloss, and color so intense as to be almost black. A large number of seedlings and new varieties were shown for the first time. It is probable that never in the history of Chrysanthemum Shows in this country, have such vigorous growth, pure color, and perfection of bloom been equalled.

GEORGE CRUICKSHANKS,
Delegate.

REPORT

OF THE

Committee on Large, Old, or Otherwise Interesting Trees

OF NEW ENGLAND.

Since submitting their last report your Committee have directed their efforts to the collection of photographs of the trees of which they had descriptions, with the view of having them bound in a book, together with a brief description of each tree; providing it could be done at a cost not exceeding fifty dollars.

As the Committee depended entirely on voluntary contributions of photographs, the work of collecting was slow, and when the required number was obtained it was found that the size of the cards varied so much that it was necessary to remove the photographs from the old cards and remount them on new ones of uniform size. Two of the most important photographs were so large that copies of a reduced size had to be taken. It was also found that the descriptions of some of the trees were deficient in important points. This necessitated the writing of letters, and the searching of records, for the needed information. All of the descriptions had to be rewritten, and an index made for the typewriter to copy.

Your Committee, with the aid of some volunteer work, have been able to produce the book, which they now deliver to the Society, for a sum not exceeding fifty dollars.

While this book contains photographs of many important trees, the Society have descriptions of a considerable number of equally important ones. The Committee would suggest that photographs of these be obtained when it can be done at a nominal cost. If the members of the Society would use a little exertion, no doubt enough

material for another book could be obtained before the close of another season, at little cost to the Society.

Your Committee desire to express their thanks to all who have contributed photographs, or have in any way assisted in the work, and in conclusion would recommend that the work be continued.

EDMUND HERSEY,
CHARLES W. KENNARD,
EDWIN FAXON,
ROBERT MANNING,
Committee.

REPORT

OF THE

COMMITTEE ON THE LIBRARY,

FOR THE YEAR 1894.

There is nothing to report in regard to the library this year which differs much from what we have stated annually for many years past. As usual all the funds at our disposal have been expended, or will be by the end of the year. The income of the Stickney Fund has been spent in accordance with the conditions specified in the instrument by which the Fund was put into our possession.

Periodicals and binding have absorbed the Society's appropriation and the special grant for the Card Catalogue of Plates has sufficed to advance that work to about the usual extent.

It may be remembered that the subject of increased accommodations for books has sometimes been touched upon in these reports, and we find ourselves compelled to speak on that well-worn topic again. Having no power in the matter we can do no more than make the following statement; duty to the trust committed to us will allow us to do no less. A glance around the walls will show that our present shelf-space is completely filled up by continuous rows of books; a farther search would show that behind the visible volumes, a very large number of others are packed away, a condition which no well-regulated library should exhibit, and whose existence in this interferes very much with its usefulness. The tables have been piled high with books, nearly or quite all acquisitions of the present year, inconveniencing all of us every time we enter the room, and hindering the work of those who are employed here, but there is, at present, no way of remedying the evil.

If we are to remain here as we are, the gallery ought to be extended around the committee-room as soon as possible, and

perhaps across one of the blank spaces of this room; a step which would damage its appearance very much, but which will soon be unavoidable. The expiration of our interest in the Stickney Fund in a few years, will not much diminish the need of more room, for, as stated last year, the gifts and exchanges we receive, together with the periodicals bought under the Society's appropriation, are more numerous than the purchases we make from the Stickney Fund.

For the Committee,

W. E. ENDICOTT, *Chairman.*

LIBRARY ACCESSIONS.

In the following list the books purchased from the income of the Stickney Fund are marked S. F.; and those purchased from the Society's Appropriation for the Library, L. A. All others were received by donation and exchange, and the source whence received is given in every instance when known.

The measurements of the books are in inches and tenths of an inch, giving first the height, next the thickness, and lastly the width. When a pamphlet is less than one-tenth of an inch in thickness the place of that dimension is supplied by a dash.

HORTICULTURE.

(Estienne, Charles.) De re hortensi libellus, vulgaria herbarum, florum, ac fruticum, qui in hortis conseri solent, nomina Latinis vocibus efferre docens ex probatis authoribus: in adolescentulorum gratiam, multo quam antea locupletior factus. Cui nuper additus est alius libellus de cultu et satione hortorum ex antiquorum sententia. Half dark green calf, 6.3×.4×4., pp. 141. Lutetiae: 1545. Dr. E. Lewis Sturtevant.

Lauremberg, Peter. Apparatus plantarius primus: tributus in duos libros. I. De Plantis Bulbosis. II. De Plantis Tuberosis, etc. Adjunctæ sunt plantarum quarundam novarum novae ichnographiae et descriptiones. pp. 168; 36 cuts. Francofurti ad Moenum: (1632).

[Also] Horticultura Libris II. comprehensa; huic nostro coelo et solo accommodata, etc. pp. 196; 23 plates, cuts. Francofurti ad Moenum: (1631).

Full calf, 8.3×1.3×6.7. S. F.

American Horticultural Annual. 1867. A Year-Book of Horticultural Progress for the Professional and Amateur Gardener, Fruit-Grower and Florist. Pamphlet, green, 7.3×.3×4.9, pp. 152; cuts. New York: n. d. C. H. Hovey.

Bailey, L. H. Annals of Horticulture in North America, for the year 1892. A Witness of Passing Events and a Record of Progress. Terra-cotta cloth, 8.2×1.×5.9, pp. 387; cuts. New York: 1893. S. F.

For the year 1893. . . Comprising an account of the Horticulture of the Columbian Exposition. Olive-green cloth, 7.5×.6×5.1, pp. vii, 179; cuts. New York: 1894. S. F.

Nøvik, Peter. Iagttagelser i Amerikas Havebrug. Pamphlet, light blue, 8.9×.1×5.9, pp. (1), 47; 14 cuts. Christiania: 1894. Peter Nøvik.

Garden Oracle and Illustrated Floricultural Year Book, 1894. By the editor of "The Gardeners' Magazine." 36th year of publication.

Half red cloth, 7.3×.7×5.1, pp. 228; 2 colored plates, cuts. London: (1894). S. F.

Horticultural Directory and Year Book for 1894. 35th year of publication. Blue paper, 7.1×1.×4.8, pp. 476. London: (1894). S. F.

Crozier, A. A. The Mutual Influence of the Stock and Graft. [From the Report of the Michigan Horticultural Society, 1891.] Pamphlet, 9.2×.1×6.3, pp. 44. The Author.

Coutagne, G. De l'influence de la température sur le développement des végétaux. Pamphlet, 11.1×.1×7.2, pp. 81–127. (Lyon: 1881.) L. A.

Garden Manual, The; for the cultivation and operations required for the Kitchen Garden, Fruit Garden, Flower Garden, Florists' Flowers. By the Editors and Contributors of "The Journal of Horticulture." 7th edition, revised and corrected. Green cloth, 6.7×.6×4.2, pp. 260; cuts. London: 1863. S. F.

(Hooper & Co.) Hooper's Gardening Guide. Flower Gardening, Kitchen Gardening, Calendar of Garden Operations, etc., etc. Terra-cotta cloth, 8.6×.9×5.5, pp. 284; cuts. London: [1880?] S. F.

Mosley, Oswald. Gleanings on Horticulture. Faded maroon cloth, 11.× .3×7.2. pp. 67; frontispiece, cuts. London: 1851. S. F.

Pirolle, ———. Manuel théorique et pratique du Jardinier contenant les connaissances élémentaires de la culture, etc., etc. Suivi d'un Dictionnaire des Termes de Jardinage et de Botanique et d'une table analytique des Matières. Nouvelle édition, revue et augmentée par MM. Boitard et Noisette; illustrée par M. Thiébault. Salmon-colored paper, 7.2×2.×4.6, pp. vii, 672; cuts. Paris: 1860. S. F.

Sauvaigo, Dr. Émile. Les Cultures sur le littoral de la Méditerranée. Provence — Ligurie — Algérie. Introduction par Ch. Naudin. Tan-colored cloth, 7.×.8×4.5, pp. xxiv, 324; frontispiece and 115 cuts. Paris: 1894. S. F.

Lambert's Gartenfreund. Anleitung zur Gemüse-, Blumen- u. Zimmergärtnerei, Erdbeeren- und Rosenzucht. Herausgegeben und verfaszt von J. Lambert und Söhne, Samenhandlung, Kunst- und Handelsgärtnerei, Trier. Dritte durchgesehene u. vergröszerte Auflage. Boards, gray, black cloth back, 7.×.4×4.5, pp. (8), 185; cuts. Trier: 1894. The Publishers.

Kennedy, John. A Treatise upon Planting, Gardening, and the Management of the Hothouse. 2d edition, corrected and greatly enlarged. 2 vols. Full calf, 8.7×1.×5.4, pp. xi, 280 and (2), 279. London: 1777. S. F.

Greenhouse Companion, The; comprising a general course of Greenhouse and Conservatory Practice throughout the year; etc., etc. 2d edition. Boards, drab, 9.1×1.3×5.6, pp. xii, 256, 204; colored frontispiece. London: 1825. S. F.

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FLORIDA.— Bulletins 21–24. Annual Report for 1893.

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Journal of Botany.
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Lyon Horticole.
Revue des Eaux et Forêts.
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Garden and Forest.
Meehan's Monthly.
Agricultural Science.
American Naturalist.
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National Nurseryman.
Weiner Illustrirte Garten-Zeitung.
Vick's Illustrated Monthly Magazine.
The Mayflower.
Success with Flowers.
Western Garden.
American Florist.
Florists' Exchange.
Baltimore Cactus Journal.

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Strawberry Culturist.
Grape Belt.
Forest Leaves.
Botanical Gazette.
Erythea.
West American Scientist.
Maine Farmer.
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Massachusetts Ploughman.
American Cultivator.
New England Homestead.
Our Country Home.
American Agriculturist.
Rural New-Yorker.
Farm Journal.
National Stockman and Farmer.
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Prairie Farmer.
Orange Judd Farmer.
The Industrialist.
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Good Roads.
Cottage Hearth.
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Boston Commonwealth.
Boston Times.

REPORT

OF THE

SECRETARY AND LIBRARIAN,

FOR THE YEAR 1894.

No two years' work in these departments are precisely alike, and yet that of one year is so similar to that of another that it is difficult to report the work of one without substantially repeating other reports. As to the publications, the Schedule of Prizes, and the weekly reports of the Meetings for Discussion, have been promptly placed before the Society. The Transactions have been delayed by circumstances entirely beyond my control.

The various records, including, besides the meetings of the Society, those of the Executive Committee, Library Committee, Committee of Arrangements, copies of all records of awards of Prizes and Gratuities, and the several records of Library Accessions required, have been fully kept. The continually increasing correspondence has also received the best attention possible.

The number of specimens of fruit presented for name has been larger than for several years past, and I regret to be obliged to repeat — what I have more than once before stated — that a majority of those who have left fruits here for study and examination by other experts, have not thought it worth while to take the trouble to inquire the results of such examination.

One of the most important events in the history of the Library the present year, is the gift, by the family of our late honored and respected Ex-President, Hon. Marshall P. Wilder, of a large number of horticultural and agricultural books, which, when arranged and catalogued, will add much to the value of the Library. As it has been impossible thus far to catalogue and arrange them, this general acknowledgment must suffice for the present. Another gift which should not pass unnoticed consists of a large number of seed and nursery catalogues, from Edgar Sanders of Chicago,

a Corresponding Member of the Society. Among them are many scarce and interesting catalogues, which will make our files of these aids to the future historian of horticulture much more complete.

Among the more important works which have been added to the Library during the year, I may mention Engler & Prantl's Natürlichen Pflanzenfamilien, and the Index Kewensis, which will undoubtedly become standard authorities for the names of plants; Schübeler's Viridarium Norvegicum (Plants of Norway) spoken of in Meehan's Monthly as "possibly one of the most delightful works on arboriculture ever penned;" Schneider's Book of Choice Ferns, which the (English) Gardeners' Magazine, speaking from a horticultural rather than a botanical point of view, pronounced "the most complete work on Ferns in the English language;" Schmidel's Icones Plantarum, a folio, published in 1762, with plates of unsurpassed delicacy of execution, and several works on gardening and floral arrangement in Japan. The continuations of many valuable works mentioned in previous reports have been received.

In my last report I spoke of the record of Library Accessions in 1893, as being not quite as long as that of 1892, but when printed it proved to be a little longer. It is impossible at this moment to say exactly how the record for the present year will compare with that of the last, but the probability appears to be that the great increase noted in 1892 will be permanent.

Many years ago the Library Committee said in their annual report: "Our aim must be high, no less than to make our Library contain a copy of every published work on horticulture." As the means at our disposal has not permitted this, the effort has been to select those most valuable for study and reference. In pursuing this course many books have been added by donation as well as purchase, the immediate usefulness of which may not be apparent; but those who from day to day answer the calls for books, are not infrequently surprised when some book which may have lain long unused is desired for reference. It is a part of the mission of the Society, even now not fully appreciated, to supply those works which are most useful for occasional reference, of which a complete collection would be beyond the means of our members generally, as well as beyond the accommodations of most private houses. In short it should be remembered that although it is our

aim to add to the library every practical work which may properly circulate among our members, this is not the most important part of the mission of the Library; its greatest value is not as a circulating, but as a reference library. And it should not be forgotten that we are not collecting these books for today or tomorrow, or for this year or next year, but, so far as we can foresee, for all time. There are now on our shelves books which have survived the many migrations of the Society from one hired room to another, and the building and demolition of its first hall. It is probable, and it is certainly to be hoped, that the unrivalled and invaluable collection of books, frail and perishable as they may appear, will outlast the solid building in which we are now assembled, and perhaps more than one successor.

Looking at this collection of books from a point of view no higher than the pecuniary one, a well selected library is one of the best investments of money that can be made. The demand for the class of books which are especially sought after for this library has increased rapidly within a few years past, and is still increasing, and the probability is that before many years they will be absorbed by libraries like our own, from which they will not be likely soon to come into the market again, if they ever do. If there is one here who is disposed to look at this subject only from the pecuniary point of view, he may be interested to know that we have a copy of the Pinetum Woburnense, of which an edition of one hundred copies only, with exquisite colored plates, was printed by the Duke of Bedford for presentation to his friends. It is not strange that when a copy of such a book comes into the market it brings a high price. Ours was bought in 1877, for eighteen guineas, which, as gold was then at a premium, was probably at least $100, and was then regarded by some as an extravagant purchase. Yet during the present year a copy has been sold for £140, say $700.

Under the continued increased appropriation for periodicals, binding, etc., preparation of books for the binder has been carried on, and has formed a considerable, and important part of the work done here, and we have been able to bind some, which, owing to lack of funds, had in previous years fallen into arrears.

ROBERT MANNING,
Secretary and Librarian.

TREASURER'S REPORT

FOR THE YEAR 1894.

MASSACHUSETTS HORTICULTURAL SOCIETY *in account current to December 31, 1894, with* CHARLES E. RICHARDSON, *Treasurer.*

1894.	DR.		
Dec. 31.	To amount paid on account of the Library, during 1894, viz.:		
	For books, periodicals, and binding .	$315 16	
	From income of Stickney Fund, expended for books	628 10	
			$943 26
	To amount paid for Furniture and Exhibition ware		60 30
	To Interest on Funds for Prizes, credited below	$1,892 72	
	To accrued Interest paid on $8,000 Bonds for Sinking Fund	35 00	
			1,927 72
	To Prizes awarded in 1893, paid in 1894, as follows:		
	For Plants	$1,783 20	
	" Flowers	2,201 25	
	" Fruits	1,630 80	
	" Vegetables	1,046 78	
	" Gardens and Greenhouses . .	440 00	
	" Hunnewell Prizes for Rhododendrons	105 00	
			7,207 03
	" Special Prize, Edward Hatch . . .		50 00
	To amount paid on account of Committee on School Gardens and Children's Herbariums		169 51
	" " Salaries of Secretary and Assistant, and Treasurer .	$3,600 00	
	" " Salaries of members of Committees	1,029 00	
Amounts carried over, ...		$4,629 00	$10,357 82

Amounts brought over, ...		$4,629 00	$10,357 82
To amount paid on extra services in Library .		780 75	
" " account of Committee of Arrangements . .		399 40	
" " account of Committee on Publication and Discussion		334 00	
" paid for Labor, including Janitor and Fireman . .		2,496 17	
" " $8,000 in Bonds of Boston and Maine R. R. Co. .		8,710 00	
" " Heating		639 25	
" " Taxes for 1894 . . .		2,560 00	
" " Insurance $1,201 80			
less return prem. 367 13			
		834 67	
" " City Water Rates . .		208 10	
" " Card Catalogue of Plates .		96 75	
" " Repairs		1,034 15	
" " Lighting		897 10	
" " Incidentals . . .		634 91	
" " Stationery, Printing, and Postage . . .		1,811 02	
			$26,065 27
Total payments of 1894			$36,423 09
Balance of Cash on hand, December 31, 1894 .			13,541 89
			$49,964 98

1894. Cr.

Jan. 1.	By Balance of account rendered December 31, 1893			$17,689 79
	By Income from Building in 1894:			
	Rent of Stores . .	$15,558 26		
	" Halls . .	5,163 34		
			$20,721 60	
	By Income from Mount Auburn Cemetery .		6,167 45	
	" Received Massachusetts State Bounty .		600 00	
	" " Annual Exhibitions, gross receipts . . .	$986 75		
	Less Expenses . .	576 49		
			410 26	
	" " from Admissions and Assessments		1,158 00	
	" Interest received on Bonds	$1,117 50		
	" " " on Deposits in Bank	121 66		
Amounts carried over, . . .		$1,239 16	$29,057 31	$17,689 79

Amounts brought over, . . .	$1,239 16	$29,057 31	$17,689 79
By Interest received from all other sources	55 00		
		1,294 16	
" amount received from sale of one copy of History . .		2 50	
" " " " sale of Transactions		2 50	
" " " " H. H. Hunnewell, his prizes for 1893		26 00	
" Interest credited to the following Funds against charges above:			
Samuel Appleton Fund, $1,000, at 5%	$50 00		
John A. Lowell Fund, $1,000, at 5%	50 00		
Theodore Lyman Fund, $11,000, at 5%	550 00		
Josiah Bradlee Fund, $1,000, at 5%	50 00		
Benjamin V. French Fund, $500, at 5%	25 00		
H. H. Hunnewell Fund, $4,000, at 5%	200 00		
William J. Walker Fund, $2,354.43, at 5% . . .	117 72		
Levi Whitcomb Fund, $500, at 5%	25 00		
Benjamin B. Davis Fund, $500, at 5%	25 00		
Marshall P. Wilder Fund, $1,000, at 5%	50 00		
John Lewis Russell Fund, $1,000, at 5%	50 00		
Josiah Stickney Fund, $12,000, amount	700 00		
		1,892 72	
			$32,275 19
			$49,964 98

E. & O. E. CHARLES E. RICHARDSON, *Treasurer.*

BOSTON, December 31, 1894.

Audited and approved.

H. H. HUNNEWELL,
NATHANIEL T. KIDDER,
A. HEMENWAY,
} *Finance Committee.*

ASSETS AND LIABILITIES OF THE MASSACHUSETTS HORTICULTURAL SOCIETY,

December 31, 1894.

ASSETS.

Real Estate		$250,000 00	
Furniture and Exhibition Ware		6,668 76	
Stereotype Plates and copies of History		259 50	
Chicago, Burlington & Quincy R. R. Bonds		1,500 00	
Sinking Fund, { $8,000 Boston & Maine R. R. 4½% Bonds; $10,000 General Electric Co. 5% Bonds }		18,710 00	
Kansas City, Clinton & Springfield R. R. Bonds		1,980 00	
Library		33,640 72	
A. K. Loring		359 41	
Due from tenants, December 31, 1894		1,961 07	
Cash		13,541 89	
			$328,621 35

LIABILITIES.

Mortgage		$1,000 00	
Josiah Stickney Fund, payable to Harvard College, 1899		12,000 00	
Unexpended Balance of Income of Stickney Fund, 1894		71 90	
Prize Funds invested in the Building, viz.:			
Samuel Appleton Fund	$1,000 00		
John A. Lowell "	1,000 00		
Theodore Lyman "	11,000 00		
Josiah Bradlee "	1,000 00		
Benjamin V. French "	500 00		
H. H. Hunnewell "	2,500 00		
William J. Walker "	2,354 43		
Levi Whitcomb "	500 00		
Benjamin B. Davis "	500 00		
	$20,354 43		
Prize Funds invested in Bonds:			
H. H. Hunnewell Fund	$1,500 00		
Marshall P. Wilder "	1,000 00		
John Lewis Russell "	1,000 00		
	3,500 00		
		23,854 43	
Prizes for 1894, due and unpaid		7,900 00	
			44,826 33
Surplus			$283,795 02

CHARLES E. RICHARDSON, *Treasurer.*

Membership Account of the Massachusetts Horticultural Society, December 31, 1894.

Number of Life Members per last report	557		
Added during 1894	17		
Commuted from Annual	2		
	—	576	
Deceased		20	
		—	556
Number of Annual Members per last report	232		
Added during 1894	19		
	—	251	
Commuted to Life Membership	2		
Deceased	6		
Dropped for non-payment for two years	6		
	—	14	
		—	237
Present membership			793

INCOME FROM MEMBERSHIP.

17 new Life Members, @ $30	$510 00
2 commuted to Life, @ $20	40 00
19 new Annual Members, @ $10	190 00
Assessments	418 00
	$1.158 00

CHARLES E. RICHARDSON, *Treasurer.*

Dr. *Massachusetts Horticultural Society in account with the Proprietors of the Cemetery of Mt. Auburn.* **Cr.**

For Sales and Improvements within the Cemetery for the year ending December 31, 1894.

To cost of filling up and improving land at Mt. Auburn for the year ending December 31, 1894, the Massachusetts Horticultural Society being charged with their proportion of the same:		
Birch, to Eagle and Cherry Avenues	$38 06	
Larch Avenue	226 69	
Glen Avenue	556 69	
	$821 44	
One quarter of $821.44 is	$205 36	
Balance due Mass. Horticultural Society	6,167 45	
		$6,372 81
		$6,372 81

By sales in January	$1,366 00
" " February	775 00
" " March	356 00
" " April	4,912 00
" " May	2,271 25
" " June	4,524 00
" " July	748 00
" " August	1,665 00
" " September	1,849 00
" " October	5,205 00
" " November	828 00
" " December	1,180 00
	$25,679 25
Net amount received from Receiving Tomb	1,212 00
	$26,891 25
Deduct for Annual Expenses	1,400 00
	$25,491 25
Mass. Horticultural Society ¼ part of $25,491.25	$6,372 81

E. & O. E.

H. B. MACKINTOSH, *Treasurer.*

December 31, 1894.

THE MASSACHUSETTS HORTICULTURAL SOCIETY

To the PROPRIETORS OF THE CEMETERY OF MOUNT AUBURN, *Dr.*

For one-fourth part of the following Expenditures, for grading new lands for sale during the year 1894:

Birch to Eagle and Cherry Avenues.		
12¾ days, men	$28 69	
3½ days, man and horse	9 37	
		$38 06
Larch Avenue (near Maple Avenue).		
4¾ days, men	$12 94	
57 days, man and horse	213 75	
		226 69
Glen Avenue.		
210¾ days, men	$474 19	
22 days, man and horse,	82 50	
		556 69
		$821 44
One-fourth of $821.24 is		$205 36

MOUNT AUBURN, December 31, 1894.

J. W. LOVERING,
Supt. of the Cemetery of Mount Auburn.

I certify the foregoing to be a true copy of improvements for the year 1894, rendered by the Superintendent.

H. B. MACKINTOSH, *Treasurer.*

Massachusetts Horticultural Society.

OFFICERS AND STANDING COMMITTEES FOR 1895.

President.

NATHANIEL T. KIDDER, of Milton.

Vice-Presidents.

CHARLES H. B. BRECK, of Brighton. AUGUSTUS PARKER, of Roxbury.
FRANCIS H. APPLETON, of Peabody. WALTER HUNNEWELL, of Wellesley.

Treasurer and Superintendent of the Building.

CHARLES E. RICHARDSON, of Cambridge.

Secretary and Librarian.

ROBERT MANNING, of Salem.*

Professor of Botany and Vegetable Physiology.

BENJAMIN M. WATSON, Jr., of Jamaica Plain.

Professor of Entomology.

SAMUEL H. SCUDDER, of Cambridge.

Delegate to the State Board of Agriculture.

E. W. WOOD, of West Newton.

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*Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

Standing Committees.

Executive.

THE PRESIDENT, NATHANIEL T. KIDDER, CHAIRMAN.
THE CHAIRMAN OF THE FINANCE COMMITTEE, H. H. HUNNEWELL, *Ex officio.*
WILLIAM C. STRONG. FRANCIS H. APPLETON.
WILLIAM H. SPOONER. WALTER HUNNEWELL.
BENJAMIN C. CLARK. HON. J. R. LEESON.
CHARLES W. PARKER.

Finance.

H. HOLLIS HUNNEWELL, OF BOSTON, CHAIRMAN.
NATHANIEL T. KIDDER. AUGUSTUS HEMENWAY.

Publication and Discussion.

J. D. W. FRENCH, OF BOSTON, CHAIRMAN.
C. MINOT WELD. BENJAMIN M. WATSON, JR.

Library.

WILLIAM E. ENDICOTT, OF CANTON, CHAIRMAN.
THE PROFESSOR OF BOTANY AND VEGETABLE PHYSIOLOGY, AND THE PROFESSOR OF ENTOMOLOGY, *Ex officiis.*
GEORGE W. HUMPHREY. WALTER S. PARKER.
EDWIN FAXON. GEORGE E. DAVENPORT.

Plants.

AZELL C. BOWDITCH, OF SOMERVILLE, CHAIRMAN.
DAVID ALLAN. WILLIAM ROBINSON.
JAMES COMLEY. JAMES WHEELER.

Flowers.

ARTHUR H. FEWKES, OF NEWTON HIGHLANDS, CHAIRMAN.
MICHAEL H. NORTON. J. WOODWARD MANNING, JR.
WILLIAM J. MARTIN. THOMAS C. THURLOW.

Fruits.

E. W. WOOD, OF WEST NEWTON, CHAIRMAN.
BENJAMIN G. SMITH. O. B. HADWEN. SAMUEL HARTWELL.
CHARLES F. CURTIS. WARREN FENNO. J. WILLARD HILL.

Vegetables.

CHARLES N. BRACKETT, of Newton, Chairman.

CEPHAS H. BRACKETT. VARNUM FROST. WILLIAM H. HUNT.
P. G. HANSON. WARREN H. HEUSTIS. WALTER RUSSELL.

Gardens.

JOHN G. BARKER, of Jamaica Plain, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, AND VEGETABLES, *Ex officiis.*

HENRY W. WILSON. JACKSON DAWSON.

For Establishing Prizes.

CHAIRMAN OF COMMITTEE ON FRUITS, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, VEGETABLES, AND GARDENS, *Ex officiis.*

CHARLES M. ATKINSON. PATRICK NORTON.

Committee of Arrangements.

JOSEPH H. WOODFORD, of Boston, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, VEGETABLES, AND GARDENS, *Ex officiis.*

ROBERT FARQUHAR.

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1895.

PART I.

BOSTON:
PRINTED FOR THE SOCIETY.
1896.

The following papers and discussions have been circulated to some extent in the form of slips reprinted from the reports made by the Secretary of the Society in the Boston Transcript. As here presented, the papers are printed in full, and the discussions are not only much fuller than in the weekly reports, but, where it appeared necessary, have been carefully revised by the speakers.

The Committee on Publication and Discussion take this opportunity to repeat what they have before stated, that the Society is not to be held responsible for the certainty of the statements, the correctness of the opinions, or the accuracy of the nomenclature in the papers and discussions now or heretofore published, all of which must rest on the credit or judgment of the respective writers or speakers, the Society undertaking only to present these papers and discussions, or the substance of them, correctly.

J. D. W. French,
C. Minot Weld,
B. M. Watson, Jr.,
Committee on Publication and Discussion.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

Saturday, January 5, 1895.

A duly notified stated meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

This being the commencement of the term of office of the new board of officers and standing committees, the President delivered the annual address as follows:

Address of President Kidder.

It is a custom of long standing for the President of this Society to say a few words at the first meeting in January. A pleasant custom, for then is an opportunity given to state what has been the tone of the year passed, and to express hopes and plans for the year just beginning.

We have just had a period of unusual anxiety. So well is this known, alas, that I need not have mentioned it. A good deal of daring would have been necessary to recommend any radical measure in the way of getting our long-coveted more commodious quarters. There seems at present very little promise of a material improvement in financial matters, and careful and cautious should still be our actions.

I told you last year that your Chairman needed a year to find out what the Society wanted, and that after that a second year was not any too much for carrying out what he found it desirable to do. It was gratifying to me to learn that you wanted me for another term, and I take this opportunity to thank you for the confidence you have shown in me.

In a matter of such moment as increasing the capacity of a Society like this, for that is what we want to do — not merely to

carry on the routine business, deliberation is, it seems to me, as important as push. We might easily buy a piece of land larger than this we now own, put up a building which we should find much more convenient than this, and at the end of two or three years find that we were not in the right place, and had not enough room after all.

This summer it became necessary to replace the boiler, and this was done as thoroughly as if we were to stay here forever. The entire cost was, however, but little over eight hundred dollars. Very few other repairs have been needed. This coming summer it will be necessary to do a great deal of repairing to the roof.

Perhaps my remarks have sounded as if I did not favor our moving, but I do most emphatically believe we should move, only not until we find the right place. And I think your Committee will find it yet.

On motion of Ex-President Spooner, it was voted, that the President be requested to furnish a copy of his address for publication.

The appropriations for Prizes and Gratuities, recommended by the Executive Committee on November 3, and then laid over until this meeting, came up for final action and were voted, as follows:

For Prizes and Gratuities:

For Plants, ...	$2,000
For Flowers, ...	2,500
For Fruits, ...	1,800
For Vegetables, ...	1,150
For Gardens, ...	500
And a special appropriation of one hundred dollars for prizes for Palms, etc., at the meeting of the American Carnation Society, in the Hall of this Society, February 21 and 22, 1895, ...	100
Total for Prizes and Gratuities, . .	$8,050

The President, as Chairman of the Executive Committee, reported from that Committee a recommendation that the Society make the following appropriations:

For the Committee of Arrangements, this sum to cover all extraordinary expenses of said Committee, .	$400
For the Library Committee, for the purchase of magazines and newspapers, binding of books, and incidental expenses of said Committee, ...	400
For the same Committee, to continue the Card Catalogue of Plates, ...	100
For the Committee on Publication and Discussion, including the income of the John Lewis Russell Fund,	300
For the Committee on School Gardens and Children's Herbariums, this sum to cover all incidental expenses of said Committee, and to be paid through the usual channels, ...	250
For the salaries of the Treasurer and Superintendent of the Building, and the Secretary and Librarian, . .	3,000

These appropriations were unanimously voted.

The President also reported that the Executive Committee had appointed Charles E. Richardson to be Treasurer and Superintendent of the Building, and Robert Manning to be Secretary and Librarian for the year 1895.

The President further reported from the Executive Committee that they had voted to recommend to the Society the payment of $50 to William Castleton of East Boston, for his efficient services in extinguishing the recent fire in the Society's Hall. This appropriation was also voted by the Society.

The President reported in regard to the subject of a course of lectures by William Hamilton Gibson, referred to the Executive Committee at the last meeting of the Society, that they deemed it inexpedient to make any appropriation for that purpose.

On motion of William C. Strong, it was voted that the President appoint a Committee on School Gardens and Children's Herbariums for the year 1895. The President appointed as that Committee, the following named persons:

Mrs. Henrietta L. T. Wolcott, *Chairman.*
Henry L. Clapp, William E. C. Rich,
George E. Davenport, Miss Katharine W. Huston,
Mrs. P. D. Richards, T. Otis Fuller.

J. D. W. French, Chairman of the Committee on Publication and Discussion, announced that the Schedule of Prizes for 1895 had been printed and a copy mailed to every member of the Society; and that the series of meetings for Discussion would commence on the next Saturday, with a paper entitled "A Day with our Birds," by Mrs. Kate Tryon, of Cambridge.

John G. Barker, Chairman of the Committee on Gardens, read the Annual Report of that Committee, which was accepted and referred to the Committee on Publication.

William C. Strong moved the following vote:

That a Committee of three members be appointed by the Chair, to consider the expediency of placing the property of the Society in the hands of a Board of Trustees, with authority to consult with legal counsel in reference thereto; and to report to the Society such recommendations as may appear desirable.

The motion was seconded by J. D. W. French, and carried in the affirmative. The Chair said that he would announce the Committee at the next meeting.

Mr. Strong moved that the Report of the Committee on the Revision of the Constitution and By-Laws, be taken up. This motion was carried, and the amendments proposed were, after two readings, approved by a majority vote, and ordered to be entered on the records, for consideration at the Stated Meeting on the first Saturday in April.

The Report was as follows:

The Committee to whom was referred the consideration of the Constitution and By-Laws of the Society, with special reference to Section VI, submit the following report:

A difference of opinion arose at the outset, as to the scope of the work to be done by the Committee. The prevailing opinion obtained, that we should review the entire code, and submit such suggestions as might seem desirable. Accordingly your Committee has held numerous sessions and given careful consideration to the various articles.

It does not appear to be necessary, or desirable, to make any radical changes in the present code. There are, however, some duties of the various officers, which it seems desirable to specify more distinctly. Some condensation and rearrangement of the articles, and a change of phraseology would also, in the opinion of your Committee, tend to more clearness.

In regard to Section VI, a decided difference of opinion still exists. A majority of your Committee recommend a change of phraseology of the second paragraph of the section, so as to make its meaning more clear.

The Board of Control of the State Agricultural Experiment Station having been merged with the Trustees of the Massachusetts Agricultural College, a change in Section II is necessitated thereby.

A copy of the various changes suggested by your Committee has been type-written, and is herewith submitted.

In connection with the consideration of the interests of our Society, and the largely increased valuation of its property, your Committee wish to suggest, and earnestly recommend, that its property be put in the care of a Board of Trustees, in order to its more secure and efficient management. To this end we recommend that legal counsel be employed to advise in regard to the mode of procedure.

WILLIAM NICHOLSON, of Framingham, and
LEONARD THOMPSON, of Woburn,

having been recommended by the Executive Committee for membership in the Society, were, on ballot, duly elected.

Adjourned to Saturday, February 2.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, January 12, 1895.

A Meeting for Lecture and Discussion was held today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

Following is a synopsis of the Lecture, prepared by the author for this report:

DAYS WITH OUR BIRDS.

By Mrs. KATE TRYON, Cambridge.

When your Committee did me the honor to ask me to speak to you on my favorite subject, I at first felt it necessary that I should study long and well the food habits of my birds, that I

might not commit the mistake of recommending you to love any birds which, as horticulturists and agriculturists, you never could or never ought to love. Study I did,— with a result which can be summed up in two minutes. I thought it little worth while to repeat to you tales of the wonderful reproductive energy of noxious insects — you, who know but too well the sad facts of the case. I deemed it unnecessary to tell you at this late day — what you know very well — that birds were created by a wise Providence to keep this insect host in subjection. You know that the bird-haunted country is more fertile than the birdless country, and you know the punishment that has come to countries which, like France, have allowed their birds to suffer slaughter. You know that our own birds are not protected and encouraged as they should be. I feel certain that you, as students of Nature, are convinced of this. How, then, is it my duty to treat the subject of the hour? Certainly I should show myself unappreciative of my opportunity, did I not, above all, aim so to speak of your friends, the birds, as to stimulate new interest in them — so as to make you resolve that we must have more, not fewer, of them.

Fortunately or unfortunately for my subject this morning, I myself have had absolutely no experience as farmer or gardener, and shall not presume to decide whether or not the crow and the English sparrow must go. That problem is beyond me. I leave it for your Society, at some particularly lucid moment, to settle to your satisfaction. But if in that inspired discussion you should be anxious to find out which side of "the fence" I am on, perhaps I should exclaim with Thoreau: "Bless the Lord, O my soul! bless Him for wildness; bless Him for crows that won't alight within gunshot!" Apropos of the English sparrow question, I might suggest that the Almighty created him — though not in America; this, in all seriousness, for I cannot now consider the English sparrow a joking matter. "Do you think the English sparrow has driven our native birds away?" is the question a bird student meets everywhere. The questioner thinks affirmatively — that *all* our birds have been driven away. The fact is, this person never sees or hears birds anyway, and would scarcely know whether they went or staid. Perhaps as he came along the suburban street this very morning (in May), he passed a rose-breasted grosbeak, an oriole, a yellow warbler, and a red-eyed

vireo. Ah, yes, we have about us, in unexpected places, a wealth of bird-life. If everybody knew this, and appreciated it, we might be still more blessed as the years go on, for then everybody would contrive to keep natural shelter and food for the birds, and the birds would pay their board and lodging with interest.

After these introductory remarks, by means of stereopticon pictures of New England scenery and birds, the audience enjoyed a series of spring and summer bird-hunting strolls. First along an April road, a flock of crow-blackbirds were found, creaking and chucking in the tops of tall oaks. This bird, said the lecturer, bears an unpleasant reputation among growers of corn and fruit, and yet he is distinctly an insectivorous bird, and eminent authorities who have dissected hundreds of them, at all times of the year, find only trifling evidence of vegetable diet. Their case is precisely that of the robin. They are so gregarious and so numerous, that no ill-doing on their part escapes observation. If any one is inclined to shoot either of these birds, he should not do so before looking over such unbiased reports as those found in B. H. Warren's "Birds of Pennsylvania."

The bluebird's warble came from over the fields, very plainly suggested by the speaker's imitation, and the old favorite, in glowing plumage, was seen sitting on a fence-post. Here is a bird of whose usefulness there is never a question. Will not everybody who lives where bluebirds could possibly come, put out a house or a box to catch their fancy when they arrive in March? To be sure, the English sparrows, if present in your neighborhood, may take possession; still, the bluebird is a plucky fellow and knows how to look out for number one, as the purple martin knows to his sorrow.

The familiar song sparrow was heard and seen, singing beside the meadow brook, and his relations of the finch family were also introduced — the chipping sparrow with his hair nest in the orchard; the vesper sparrow of the dry hillside; the white-throated sparrow with his clear "Old Sam Peabody, Peabody, Peabody," whistle, and the handsome crimson finch (American linnet), with his craving for the spring buds of certain trees. But what matter for this? Did anyone ever miss the small number of leaves or orchard fruit that these birds nip in the bud? And how short is the season in which they can commit this mischief. Of

course if he takes a fancy to your blossoming trees, you may as well drive him off, for he has hundreds of useless wild or half-wild trees to go to.

The red-winged blackbird of the bushy swamp and overflowed meadow, is everywhere characteristic. His "tchuck!" and "gurglee!" are familiar to everybody. Redwings, with the robin and crow blackbird, repair to the ploughed land as soon as they come and these birds rid the soil of an incalculable number of noxious insect-grubs before the sowing. The dissector brings no bad record against this bird, and the cultivator who shoots them is very short-sighted, as regards his own interests. Indeed, to sum up this matter, a bird should never be shot because he *sometimes* offends. If he makes himself a nuisance for a week, or even a fortnight, he is making himself useful (although it may not be, indeed, in your particular neighborhood,) for the rest of the year. So that to grudge a bird an ear of corn is ill-treating the unpaid little workman, who made the crop possible. You *can* keep birds away from your crops, but to battle with the insect host is beyond all human ingenuity.

The golden winged woodpecker's resounding reveille came ringing over the countryside from the still leafless woods. This large, gaily marked woodpecker is known to every man or boy who has ever carried a gun. Alas, that this should be so! for here we have a truly famous eater of grubs and insects, gleaned from the soil as well as from the bark of trees. Farmers are often their own enemies, and never more certainly so than when they shoot for sport as they do, law or no law, "one er them air yaller hahmers," as they call them down in Maine. It is true, I suppose, that one woodpecker, the yellow-bellied sapsucker, decorates trees with those admirably even rows of holes, not for insects within the bark, but for the sap, the life-blood of the tree. But he doesn't spend all his time doing this, and he is now, in most localities, rare enough to cause regret to the bird-lover, and satisfaction to the forester.

The robin was the last of the spring birds treated. He is certainly fond of such dainty fruits as strawberries and cherries; but he has helped protect them from worse enemies. To shoot all the robins would be a dangerous experiment. From the economic point of view alone, no bird would be more missed.

The summer birds were seen in a June day's stroll through fields and groves near Boston. Each was interestingly characterized, often by original stories and imitations of notes and songs. Most prominent among these were the golden robin, kingbird, bobolink, rose-breasted grosbeak, red-eyed vireo, thrasher, scarlet tanager, indigo bird, chewink, cuckoo, the thrushes of the wood, blue jay, cedar bird, goldfinch, and some of the warblers, such as the redstart, yellow warbler, and Maryland yellowthroat. The haunt of each was shown on the screen, the bird itself in its natural colors and attitude.

The rose-breasted grosbeak, a bird now quite common in most Massachusetts towns, is known in Pennsylvania as the "Potato-bug bird," it being the only bird known to eat this pestiferous beetle.

In the above list of our common summer birds there are only two or three but are known as beneficial to the cultivator. Not far from the head of the list, for value, should be placed the red-eyed vireo and his numerous tribe, birds nearly allied to the fly-catchers proper. There are several species of these slim, little olive birds, and although they are little known, save to the bird-student, they doubtless far outnumber the robins. They prefer hard wood growth, chiefly maple, elm, and oak, and are common alike to forest, and suburban street.

As soon as one begins to make a study of bird-life, (which is of the utmost importance to one who tries to cultivate anything) the study of trees and shrubs obtrudes itself also. So attached is each species to a particular tree, or kind of copse, that the farmer or fruit grower might in time have a hand in choosing his bird-visitors or tenants by cultivating conditions liked by his favorite birds, and by omitting to cultivate conditions that might attract those which he considers his enemies.

Again the season is at hand in which we are to make the earth produce goodly fruits and pleasant flowers for our use and cheer. Let us add a new preparation this time — a new knowledge and appreciation of our feathered friends, without whom — did you ever think of it? — the earth could bear not even a blade of grass.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, January 19, 1895.

A Meeting for Lecture and Discussion was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The following paper was read by the author:

FLOWER POTS AND THEIR MANUFACTURE.

By A. H. HEWS, North Cambridge.

When your Committee recently invited me to give you a talk on "Flower Pots and their Manufacture," I was at first strongly tempted to decline, feeling myself to be but poorly gifted in that direction. But as the invitation went further and allowed me the alternative of reading a paper, it seemed hardly courteous or possible to refuse.

Some of you may be aware of the existence of a Centenary club in Philadelphia, to which I have the honor of belonging; but as it may be new to others, I take the liberty of mentioning it. My membership is due to the fact that, sometime previous to the year 1765, my great grandfather commenced manufacturing pottery in the town of Weston; and through three successive generations (my own being the fourth) the business has continued in the direct family line without a break. This makes our firm eligible to the Centenary club, which consists of firms that have had an uninterrupted ancestral record of one hundred years or more in the same business. Having alluded to the existence of this club, may I be permitted to mention an item or two in connection with it, which may be of interest to you.

Up to the present time we have found but thirty-one firms in the United States that can claim membership. The leading one among them is the Francis Perot's Sons Malting Company, established in 1687 — 208 years of unbroken business record. The account given us at our first annual dinner by a member of this firm, of the early days of the business and its varying fortunes — also of the interesting process of malt making — was in itself well worth the trip to Philadelphia. Another remarkable fact concerning this club is that of the thirty-one firms which compose it twenty-one are in the state of Pennsylvania.

No one knows better than myself that pages of dates and figures make very dry reading, and I will endeavor not to weary you with them. Yet if I could, at this time, tell you the year when our firm began to make flower pots, to whom they were sold, and at what prices, it might interest us all. Unfortunately there is a long break in our records.

Our oldest account book which I bring with me today as evidence, shows that the first entry reads as follows: "Weston, April 19, 1775, Lemuel Jones, to Ware, debtor: 0£ 2s 8d;" and on the same day, another: "Isaac Flagg, to Ware, Dr., 0£ 2s 7d." The next charges were made on the 29th of that month, and there were three of them. In May of the same year there were eight more. No further sales were recorded until February 20; whether of 1776 or the year following, the book fails to tell.

From this time to 1788 the record is again broken. But from 1788 to 1810, a period of twenty-two years, we have a continuous account. The charges during that entire term cover about as many pages as we now often use in one day; and the amount in dollars and cents does not compare with single sales of the year 1894.

I have taken time to reckon up the sales of three years. The charges were made, for the most part, in English money,—pounds, shillings, and pence. But I find that in June of 1801 the form of entry was changed temporarily to the then new American method of computing values in dollars and cents. This evidently perplexed the accountant, who after two entries went back to the familiar English money. In June of the next year they made a second attempt to keep the books by the American system of reckoning, and were again, it would seem, speedily discouraged.

It is a somewhat interesting and remarkable fact that a third attempt was made in June of 1803. The books became American once more, but even then for a short time only. After this third experiment, they became apparently disgusted with the simple scale of tens by which America had decided to regulate her monetary system. Doubtless they returned gladly to the more involved and complex calculations which familiarity had endeared to them. But at last in 1807, again in June, the fourth attempt was made — this time successfully. After that there was no return to the old English currency.

Through all these years the term "flower pots" does not once appear. Again the record is broken; and I very much regret that the books containing the first sale of flower pots and the name of the purchaser cannot be found.

Those of you who can remember the year 1861, will recall the depressed condition of business after war was actually declared, and the discouragements that seemed to hang over nearly all branches of industry and trade. The members of the Hews firm looked on the dark side and felt sure that there would be no demand for flower pots, they being more of a luxury than a necessity, and that the factory must close. At that time I succeeded in getting permission to make my first venture as salesman "on the road." Going first to C. M. Hovey, I secured from him what was a good order for those times, some 10,000 pots or more for the spring trade of 1862. Several other good orders were booked that day, and it is needless to say I went home happy.

Not once after that, during the four years that the old firm continued to exist, were they able during the busy seasons of spring and fall to fill all their orders for flower pots. Not that these orders were remarkably large or numerous, but they were beyond the capacity of the firm.

My own records date back to October, 1866. The title of the firm at that time was Horatio Hews & Son. The first sale recorded was to Joseph Holmes, Grocer, of Cambridgeport; the second to Hovey & Co., of Cambridge; the third to Frank Becker. The prices were from 33 1–3 to 50 per cent higher than those of today, which is more than I should be willing to admit of the relative excellence of the goods.

We first got fairly under way with machinery for making small flower pots in 1869. I well remember that my father, always disposed to be a little cautious, thought that we should overstock the country and ruin the prices. We did in that year what we thought was a wonderful business in flower pots. We exceeded it by 33 1–3 per cent in the month of October, 1894.

It would be interesting to describe the great craze of the American people in 1875 and 1876 for reproductions of art-pottery — how we looked through every museum this side of Washington for copies of the pre-historic shapes — and to give an account of our success in reproducing from the grand collection of Gen. Cesnola, and from his discoveries in ancient tombs at

Idalium, Cyprus, of forms which were supposed to be of Phœnician manufacture, and to have extended back over a period of 1,500 years before Christ. It would also be interesting to describe the quaint shapes from Dr. Schliemann's collection, taken by himself personally in his excavations on the supposed site of ancient Troy. Through the kindness of the late Professor Horsford, we received the first photographs of those which were sent to America, and had the shapes reproduced here before the originals had reached the museum.

In telling you about the manufacture of flower pots, I must confine myself to personal knowledge of the subject, for one might look through the libraries of the country and the encyclopedias of the world and find himself not a whit wiser about flower pot manufacture at the close of his investigations than at the beginning.

As I have never visited any such factories in European countries, my information concerning them has been derived mainly from workmen who have come from foreign potteries. They have uniformly felt and assured me that America is always in the lead in regard to all improved machinery.

Until about 1864 or 1865 common flower pots throughout the world had always been made by hand on the potter's wheel. There had been, indeed, many different forms of this wheel, but it had always been propelled by the movement of either hand or foot, and this meant of course constant actual labor, more or less wearisome. When in the early fifties a wheel was made to be propelled by the foot, with two sizes of pulleys and a balance wheel, whereby the speed of the wheel was increased in the proportion of three to one, it was thought that perfection had been reached.

Much time, though probably very little money, had been spent previously to this date in attempts to make a pot machine; and it was left to Mr. William Linton of Baltimore, an experienced practical potter, to perfect and patent the first machine.

From him we purchased two machines and the exclusive right to use them in this State; and within a short time we were able to make great improvements upon his patent; so that I feel perfectly safe in stating that, from time immemorial until down to about the year 1863, flower pots had always been made in one and the same way — by hand, on a potter's wheel.

Some of you may ask how many could be made in a day. When some of the boys in the old pottery "broke the record" by making one thousand three-inch pots in ten hours, I am sure it created as much excitement among the other workmen as a Harvard-Yale boating bulletin suspended in a store window seems now-a-days to arouse in the minds of Cambridge students.

Then came the machine, which, however, made only small pots, up to about five inches in size: and while it had previously taken an experienced man to make his thousand three-inch pots per day, a smart boy without any previous experience whatever, could, in the same number of hours make three thousand on the machine. This was back in the sixties. If I told you how many we make now per day, you might question my veracity.

As I have previously said, these machines do not successfully make pots larger than the five or six inch size, and when the standard pot was adopted a few years ago, the hand process was practically abandoned in the principal potteries of the country, and the use of what is technically termed a jigger succeeded it. This is a revolving disk propelled by machinery. These disks, or jigger-heads, are made of different sizes and fitted with various rings.

Plaster moulds are made in very large numbers for each size of pots, and the larger standard (from six to twelve inch) pots are all made at the present time in these moulds. With us, pots from twelve to twenty-four inches are made as of yore by hand on the wheel. The making of the pot is not, it should be explained, its only cost; previously to that comes the preparation of the clay. The hundred years from 1765 to 1865, saw no improvement in the process of preparing it for use. It was ground in a wooden tank or tub, the motive power being furnished by an ox. There is even a tradition to the effect that sometimes when the ox was busy a cow was substituted in his place. Personally I cannot vouch for such a statement; but the old horse in the mill I shall never forget. When I had reached the mature age of six years I was considered old enough to go to the factory, before and after school, and drive that horse to grind clay. As I loved my books no better than the average urchin of the same age does today, that was probably the only "grinding" I did.

The various other processes remained as crude in 1865 as they had been a century previous — the drying, firing, and all connected with the manufacture.

The capacity of our flower pot drying rooms of today far exceeds the entire product of any one year prior to 1865. At that time the custom of using wood for drying and firing pots still continued. It required three cords of white pine and from thirty to forty hours' labor thoroughly to fire a small furnace. Today three tons of bituminous coal will fire five times as much pottery in fifteen hours.

It is a very common saying that one flower pot is as good as another, provided it will hold together long enough to grow the plant; which is equivalent to saying that one rose is as good as another; and when they say that one pot is worth no more than another they might as well say that a hybrid should be sold at the price of a tea rose. It has always been our practice to make, at a fair manufacturing profit, the best flower pot that could be produced. The late C. M. Hovey has often said to me, "Mr. Hews, I want all perfect pots." Then he would go on to explain why he wanted all perfect pots. "You see, Mr. Hews," he would say, "I am potting a nice plant which will be worth two or three dollars and I want a nice straight pot for it, but I am obliged to pull the pile over before I can find one. Then when I have found it, it is sure to be of such a soft burn that it will hardly hold together." Then he would take me into the greenhouse and hunt for a nice plant and at the same time be very sure to select one that happened to be in a warped, cracked pot. "And now you see, Mr. Hews," he would say, "that pot just spoils the sale of the plant unless I re-pot it." That was before the day of standard pots, and I am sure no man would have appreciated the standard size more than he.

When the Society of American Florists met at Washington in 1892, I spent several hours in the greenhouses of the various departments, in company with a prominent member of the Horticultural Society, who had never happened to visit the city before. To a certain extent I had prepared him for the kind of flower pots he would find there. I think he would say, if he cared to discuss the subject, that I had not underestimated them. To say that many of them looked as though they belonged to that class of pottery found in the Indian Mounds of Mexico, would be a reflection on the aborigines.

The poor preparation of poor materials is largely the cause of the thousands of inferior flower pots that flood our markets.

Grades of clay used in the manufacture of flower pots are almost as numerous as the banks in which they are found, and require many different methods of treatment; and to proper treatment is largely due the excellence of the ware. Our bank in Cambridge contains a very superior quality of clay for flower pots. Unfortunately for us, it also contains very many small stones which must be disposed of in some way before using.

To separate the clay from the stone has always been a very perplexing as well as expensive operation, and we have spent many thousands of dollars to accomplish this end, and are still experimenting. Three years ago we erected at our clay bank an expensive factory for this express purpose, putting in machinery capable of handling six hundred tons daily, which produced one hundred tons of sifted clay. A short description of this process may be interesting to you.

The clay is first ploughed by means of a horse and capstan, whereby one horse will do the work of twenty men with picks. This clay is then loaded in dump carts and carried to the mill, where it is shovelled through a disintegrator which expels the larger stones and crushes the smaller ones. It then falls on an endless belt and is carried to a revolving dryer. This is a new western patent, wherein by the use of crude petroleum for heat, we evaporate from twenty to twenty-five per cent of moisture from the clay, and while it passes through a direct blaze of white heat there is sufficient moisture all the time to prevent it from burning, which at this stage would make it worthless. To demonstrate this point beyond question, paper and dry shavings were passed through with the clay, and they came out without even scorching.

From the dryer it goes into large bins, where it must remain twenty-four hours, so that portions of it which have become too dry and hard may absorb the moisture from that not dry enough. From these bins it is carried to whippers, which beat the clay without further crushing the stone. From the whipper it goes to the revolving screens, and thence to the elevators.

The next process is mixing, or, as we term it, pugging, the clay, which is all done by machinery. From one machine it comes out very soft and plastic, to be worked in plaster moulds; from the other cut into hard cubes for the iron moulds of the machine.

The pot machine and jigger of today does each the work of from six to eight men at the wheel, even at as late a date as 1885.

The difference in cost between a good and a poor pot is very slight, and if the florist will demand and accept nothing but a first class pot, a standard in quality as well as in size will soon be reached. Some may ask what constitutes a standard in quality, and I would thus define it. To be standard in quality a pot must be made of clay properly prepared, be of uniform firing and of a smooth surface inside as well as out. It must also be of right porosity, which can be accomplished by the proper mixture of clay, and on a machine-made pot must have a smooth rim on the inside, so that the man standing at his bench, potting thousands of plants per day as is being done constantly in large establishments, may have some flesh on his thumbs at night and more time for recreation than he otherwise would have, if he felt obliged to ask forgiveness for his forcible denunciation of the rough edged pots furnished by many manufacturers. It must also be one that will stand transportation and years of usage if necessary.

The practical florists, and there are a good many of them, were long ago convinced that the best pots are the cheapest.

Before asking forgiveness for having trespassed so long on your patience I want to say a few words about ornamental flower pots, now commonly called "jardinieres." For some years there has been a constantly increasing demand for ornamental coverings for flower pots, and we have depended very largely for these upon articles of foreign manufacture. During the past year we have paid special attention to this branch of the trade, and have produced shapes and designs second to none, have imitated glazes so perfectly that it takes an expert to detect the difference between the real and the imitation, and withal have produced these jardinieres at prices which place them within the reach of every one.

I often ask myself whether it is probable that the demand for flower pots in the next quarter of a century will increase in the same ratio as during the past quarter. And having the books at hand I simply took the total manufactures of 1869 and 1894, and found the increase as ten to one, or in round numbers 700,000 flower pots in the former year and 7,000,000 in the latter; and if the same factory can in 1920, twenty-five years later, produce and sell 70,000,000 we shall verily be living in a land of flowers.

Discussion.

Samuel H. Warren asked whether the painting of flower pots was injurious to the pots, or to the plants grown in them.

Mr. Hews replied that if the plant was properly watered, no injury would result from the paint. He also remarked that one experienced plant-grower said "we shall not reach perfection in growing plants in pots, until we do away with porous pots, and thus avoid the growth of green mould upon the outside of the pots when in use." The Japanese always grow plants in glazed pots.

William C. Strong said that if we can have our pots burned so hard that green moss will not grow upon them, it will be an improvement of great value.

Mr. Hews remarked that F. L. Harris, of Wellesley, always wants the hardest pots, and added that his firm sent a schooner load of hard burned pots to Port-of-Spain, the capital of the island of Trinidad, to a firm who grow palms there.

MEETING FOR LECTURE AND DISCUSSION.

Saturday, January 26, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The following lecture was delivered on the John Lewis Russell Foundation.

Fungous Diseases of Ornamental Plants.

By Professor Byron D. Halsted, Botanist and Horticulturist at the New Jersey Agricultural Experiment Station, New Brunswick, N. J.

In the brief time that is before us it may be well to make a visit to some large grower of ornamental plants under glass, and pass from house to house upon a tour of inspection. This series of greenhouses will be ideal in the sense of offering examples of many of the leading kinds of fungous troubles.

Without further preliminary parley we will consider ourselves as having arrived upon the grounds of our florist friend, who gives us the freedom of his houses while we discuss the subjects that are to come before us.

Fungous Diseases of the Rose. First let us pass into the rose houses. No less than one hundred and sixty-five kinds of fungous diseases of the rose are recorded in the books, and therefore only a few of the most injurious can be mentioned here.

The Black Spot (*Actinonema rosæ* Fr.) Fig. 1, a, is perhaps the most wide-spread and troublesome of the fungous diseases of the rose. It was first described in 1826 and is so common as scarcely to need mention other than by name, to be brought to the mind of every rosarian. The foliage when attacked by the Actinonema fungus soon develops the characteristic dark circular spots, while elsewhere the leaves become pale and shortly fall to the ground. A house of roses badly affected with the Black Spot will show a lack of leaves, particularly upon the older parts of the plants, and of course the quantity and quality of the blooms are unsatisfactory.

The compound microscope reveals that the fungus consists of fine threads which feed upon the substance of the rose leaf. Starting at a given point from a spore that has been brought through the air or in water from a mature black spot, the fungus spreads in diverging lines until the circular area is the size of a dime or even a half dollar. After the growth has proceeded for a time small specks may be seen upon the surface of the spot. These are the spore-bearing places, after the skin of the leaf has been ruptured or thrown off, and multitudes of spores are produced. These spores, small as particles of dust, and as numerous as the sands of the sea-shore, are the "seeds" or the germs of the fungus and are capable, after finding their way to a healthy leaf, of inaugurating a new Black Spot.

As with many other fungous diseases of plants, some varieties of roses are much more susceptible to the Black Spot than others, and therefore it goes without further saying that, other matters remaining the same, it is an important precaution to grow those sorts that are the least subject to the malady.

As we glance around in the imaginary rose house, much of the foliage is observed to be more or less covered with a powdery substance (mildew), as if the fine dust from a flouring mill had settled upon the leaves, many of which are somewhat misshapen. This powdery substance consists largely of the spores of a fungus (*Sphærotheca pannosa* Wallr.) that bears the familiar name of Rose Powdery Mildew, Fig. 1, c. This fungus is a surface feeder and does not send its filaments deeply into and between the cells of the leaf. In its habit of growth, therefore, this fungus is quite in

contrast with that causing the Black Spot. Because superficial in its manner of feeding upon its host this mildew can spread rapidly over the rose leaves and quickly become manifest.

There is another rose mildew (*Peronospora sparsa* Berk.) which differs in many ways from the one last mentioned. It is deeply seated, in that its fine filaments penetrate through all portions of the leaf and afterwards produce upon the surface a fine growth that has suggested the common name of Downy Mildew for this fungous parasite. This mildew is closely related to the ones upon the grape, the onion, the greenhouse lettuce, and several other of the destructive downy mildews.

As we pass along through the rose house some plants are seen to be nearly defoliated. An inspection of the canes will show that they are covered with small pimples, each one of which abounds in spores. These microscopic spores ooze from the pimples or small rifts in the epidermis of the cane and germinate quickly and spread the trouble. This is the Rose Anthracnose (*Gloeosporium rosæ* Hals.) and is not distantly related to several of the worst diseases of other cultivated plants. Thus *Gloeosporium fructigemium* Berk., is a widespread fungous trouble, causing bitter or ripe rot in apples, grapes, and other fruits. The somewhat fatal anthracnose of the raspberry (*Gloeosporium venetum* Speg.) is another near relative of the trouble in hand. The rose plant is most likely attacked through its young parts by the spores of the anthracnose falling upon the leaves or succulent canes and, if the latter, it may girdle the stem and thereby kill it. A plant thus infested by the anthracnose may send up new canes from near the base of the stem, which in turn are likely to bear pale sickly foliage and finally to be destroyed by the fungus that in this instance may spread to it directly from the old stem. This is one of the most contagious of the fungous diseases of the rose.

Some of the plants in the rose house have foliage that is badly marked with gray, irregular, often quite small spots. If these spots are looked at closely — and a hand lens will assist greatly — they are seen dotted over with minute black specks, the spore-bearing organs of *Sphærella rosigena* Ell., Fig. 1, b. In order that this trouble may have a common name and to avoid the word spot and any confusion with Black Spot the expression Rose Leaf Blight is proposed.

Before we leave the roses, and in answer to a question that has already been asked, I may say that the peculiar discoloration of

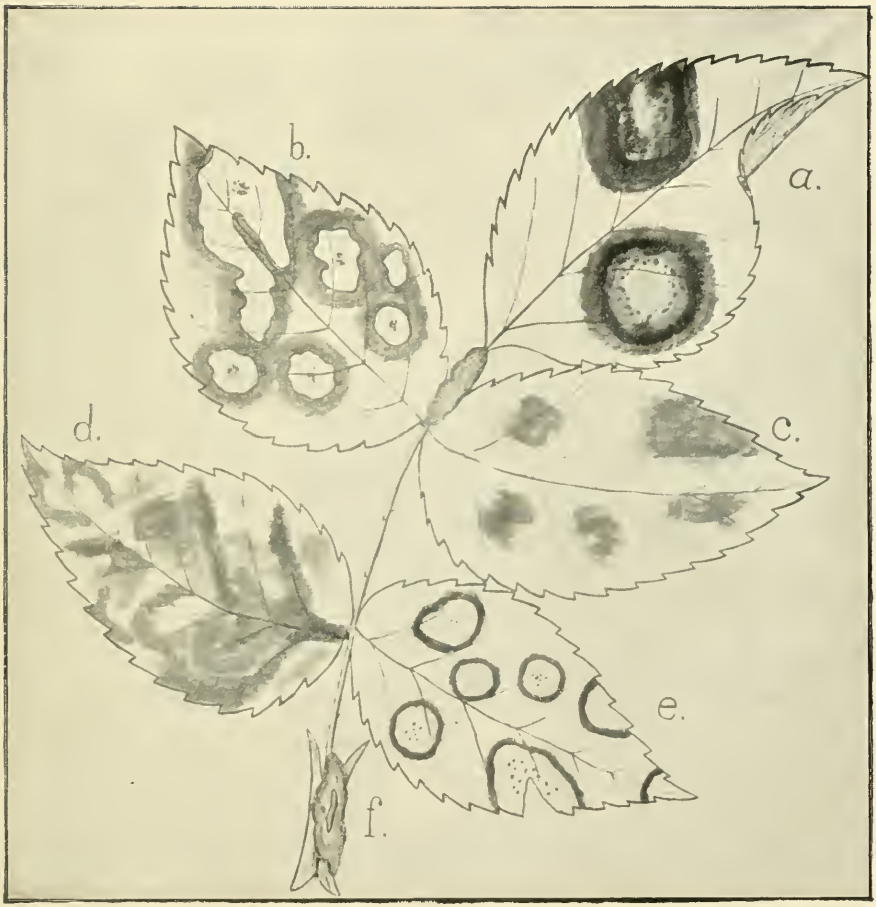

Fig. 1.

the leaves of La France, Fig. 1, d, which may for the lack of a better term be called "bronzing", is, so far as I know, not of fungous origin but probably due to a structural weakness permitting the skin to become scalded by too great sun exposure. We will now pass into the Carnation houses.

Fungous Diseases of the Carnation. The leading fungous enemy of the Carnations today is the Carnation Rust (*Uromyces Caryophyllinus* Schr.) This fungus, while quite new to this country, is an old pest in Europe, and doubtless came to us in imported stock, and within the past five years has spread throughout the country. The rust can be quickly distinguished by the plump gray blisters produced upon the leaves and stems. After the epidermis is broken the rusty brown spores escape in great numbers and the affected spots then resemble those produced by other rust fungi upon grains, grasses, and many other plants. Before the time of spore-formation the fungus has sent its slender threads in all directions through the leaf or stem, and the plant has become badly diseased.

The work of the Carnation Leaf Spot fungus (*Septoria Dianthi* Desm.) is easily recognized by the light brown patches upon the leaf and stem. While not confined to any portion of the plant, upon the stem it is most frequently found between joints. The lower half of the leaf usually has more spots than the upper half, and frequently a leaf bends abruptly downward near the middle when a large spot has weakened it at that point. Occasionally a leaf may have several bends downward and sidewise, due to as many diseased spots. Over the light brown (sometimes reddish) affected areas, there develop a number of minute black specks, which in an old spot can be readily seen with the naked eye. These specks consist of flask-shaped bodies, the walls of which are formed of the interwoven threads of the fungus, and upon the inside a vast number of long needle-shaped spores are produced. The spores, mingled with a viscid substance, ooze from the small opening through the wall of the flask and afterwards become disseminated in various ways. In some of the fungi previously mentioned, the spores have been described as produced without cover upon the surface of the plant, but in the Carnation Septoria the surface is finally reached by the discharge through an opening. When lying upon the surface they may be moved when dry by currents of air, as motes float in a sunbeam. On the other hand any stream of water never so small can carry them along.

In case of plants under glass where watering is frequent it is likely that the wet method of transportation is most active, especially if the hose is used with considerable force. A strong spray playing upon a healthy plant through one affected with the Leaf Spot would be quite sure to carry along an abundance of the spores and leave them in drops of water in a suitable condition for germination. The prevalence of the disease at the base of the clasping leaves of the carnation may be due to the fact that the water is held there longer than elsewhere.

The Carnation Anthracnose (species not fully determined) is a third fungous trouble frequently met with, and may be characterized by sharp-pointed black hairs arranged in microscopic rosettes upon the surface of stem or leaf. The spores are borne upon the tips of radiating threads intermingled with the black hairs. This fungus is fond of moisture and is most frequently found upon the lower stems and leaves that lie upon the earth or are matted together. A whole branch may be destroyed by the anthracnose that has affected its base and checked the flow of sap.

The Leaf Mould (*Heterosporium echinulatum* Berk.) is a fourth fungous trouble of the Carnation, which is easily distinguished by its forming circular spots in the foliage varying from a small dot to a ring extending across the whole leaf. At first the spot is of a pale ashy color covered with a dense mould, but changes with age to a dark brown. This change of color is due to the maturing, upon the minute branches of the mould, of many spores. When fully ripe the spores are covered with microscopic prickers. In its worst form a plant, and particularly the younger portion, will be literally covered with the blending circular spots of this fungus.

The last fungous disease of the Carnation to be mentioned before passing on to the violet houses is of bacterial origin. The germs of this disease are exceedingly small, there being no thread-like structure or spores as met with in the fungi previously mentioned. Attention is attracted to the victim by the manifest lack of vigor, and the consequent failure to produce the usual number of blooms. If a leaf of a diseased plant is held up to the light many somewhat transparent dots will be observed, varying from a mere point to specks an eighth of an inch in diameter. These dots are the starting points of the bacteria which, swarming in the cells of a leaf, destroy the ordinary green substance (chlorophyll), and finally the leaf becomes discolored and lifeless.

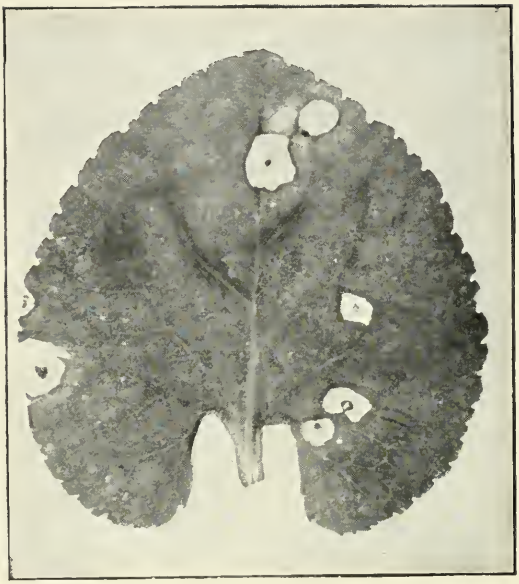

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

The change of color in the affected leaf is controlled somewhat by the color of the bloom. In the yellow varieties the foliage often turns to some shade of lemon, while purple is not infrequent in the pink sorts. The bacterial germs most likely enter the leaf through the stomates and, multiplying, spread from there.

This bacterial disease sickens the whole plant, and there is no fungous growth that breaks through the epidermis as in the rust, etc. Many other plants are liable to similar affections, the most widely known being the twig or fire blight of the pear, apple, and quince trees.

Fungous Diseases of the Violet. Passing from the carnation to the violet houses, we observe that health does not prevail. Some plants are stunted, others are yellow, while others still have the foliage blotched and spotted in various ways. It will be best for us to single out certain leaves and note the fungi that prey upon them.

The Violet Leaf Spot (*Cercospora Violæ* Sacc.), Figs 2 and 3, as the common name suggests, causes the foliage to become more or less covered with circular spots. There are several fungi causing the spotting of violet leaves, but the Cercospora can usually be detected by the dark centre of the spot due to the multitude of spore-bearing threads that are brown colored. Black moulds of various kinds often flourish upon the dead tissue of the spot and greatly change its appearance.

Another spotting of the violet leaves is caused by another fungus, namely, *Phyllosticta Violæ* Desm., Figs. 4 and 5, of a quite different type from the one above mentioned. By the naked eye, when carefully inspected the Phyllosticta spots are seen to have no dark central area, but scattered over the whole brown spot are minute dark specks in which the spores are borne. The Cercospora spot has the spores on minute aërial branches, but in the Phyllosticta Spot the spores are formed within flask-like bodies, and ooze out of the open neck when mature. Similar to the Phyllostica are a number of other violet parasites, as *Marsonia Violæ* Sacc. Besides these there are some fungi which cause blotching of the leaf and a general collapse of the whole plant. For example, there is an anthracnose (Gloœosporium) of the violet similar to the one mentioned upon the rose. There is a bacterial trouble also, so that the violets are fully supplied with fungous parasites.

Fungous Diseases of Dracœnas. Some of the cultural varieties of Dracœnas, notably the *Cordyline terminalis*, have failed to

preserve their health. The fungus *Phyllosticta maculicola* Hals., is recognized by producing small brown angular spots in the leaves, which finally show spore-bearing pimples.

There is a tip blight of *Dracæna fragrans* that often greatly disfigures the otherwise highly prized plants. "It is often the tips of leaves that are most subject to the bad effects of the blight, and this is true of many other than the Dracæna plants. This may be due to the fact that the water holds to the pendent tips longer than to any other portions. When the plants are sprinkled the upper portions of the foliage retaining only a film of the liquid quickly dry off, while the water descending to the tips remains there for a long time. The presence of this moisture upon the surface of the leaf-tips furnishes the proper conditions for the germination of spores that may have been brought there by the descending water as it flowed along, gathering to itself the spores previously deposited upon the surface of the leaf. It is thus seen that there are at least two good reasons why the tips of drooping leaves may be infested with fungi while the upright parts escape. As a matter of fact, however, such portions do not wholly escape. Not infrequently in the case in hand, the Dracæna leaves may be blighted midway of tips and base. In such instances it is possible that at some time there has been some injury by means of which the spores found an easy place to germinate, and their germ tubes to penetrate the leaf.

There is a third reason why the tips are more susceptible, namely, the greater surface exposed in proportion to the amount of tissues, than in the other parts of the leaf. The entrance of disease germs is largely a surface action, and therefore the chances are greater as the tip of the leaf is approached. The tips being thinner and farther from the base of interior water-supplies, often suffer from wilting, and become dried naturally. Anything of this nature assists the parasites to get a foothold. The wonder is that more tips are not attacked. When once a fungus has established itself, it will begin to work its way in the leaf toward its base. This advance may be quite uniform and rapid, so much so that there is a distinct line between the living and the destroyed tissue."*

Fungous Diseases of Palms. The growers of palms are far from exempt from troubles of a fungous nature. It is difficult to

*From the writer's Report from the New Jersey Experiment Station for 1893.

name the palms that are most affected, many of them becoming blotched more or less with one or another fungus. A tip blight is not uncommon. I have studied the Kentias more than any other palms and will speak particularly of them. If the dying of palm leaves was confined to the tip it might be concluded that the decay was due to the extreme susceptibility of the delicate end of the leaf to untoward influences, but it is not unusual to find circular spots in the body of the leaf that have the same associating fungus. The tips blight more frequently, possibly, because they are pendent and water collects and is retained there, giving the spores favorable conditions for germination. The fungus found in these blighted tips and elsewhere in the leaves is an anthracnose (*Colectotrichum Kentiæ* Hals.). It is a deep feeding parasite and causes the ruin of the plants or so disfigures them as to forbid their going to market.

Fungous Enemies in the Orchid House. The royal and fantastic family of orchids is not free from fungous enemies. The Sobralias, for example, are killed outright by an anthracnose (*Gloœsporium cinctum* B. and C.) that works in the foliage. In like manner the large and tender leaves of the Bletias are preyed upon by several blights that greatly disfigure the plants. In many instances the pseudo-bulbs have large pits of decay due to one or more fungi. Occasionally the large and otherwise superb flowers of various orchids are spotted and blotched with brown which in some instances is due to micro-organisms. It is to be remembered that the tissue of the floral part is exceedingly delicate in structure, and also the colors are such that any disease is remarkably conspicuous. Sometimes the spotting consists of minute specks, in great numbers, scattered over the whole surface of the petal, and so uniform is this that one might almost conclude at first sight that it was characteristic of that particular species of flower. It is often true that the little specks will be bordered by a delicate ring of pink which will heighten the peculiar appearance of the blighted portion. There may be on the other hand only a single blighted patch, and this, by rapid increase, spreads throughout the whole orchid flower. When a petal is thus attacked it soon becomes worthless and falls down, either remaining attached by its base or drops away entirely. Such patches, upon examination with the compound microscope, reveal the presence of a fungous growth which is well known to the gardener as the gray mould. This gray mould (*Botrytis vulgaris*) is the most common to be met with

upon old blooms in greenhouses or other warm, moist places, and, abounding in spores which are borne upon the tips of slender threads, it keeps the atmosphere well stocked with germs, and these falling upon the delicate tissue of the orchid bloom will induce decay.

As a precautionary measure it goes without further saying that any and all old and worthless parts of greenhouse plants that are harboring this gray mould, or in fact any fungous growth, should be promptly removed from the place and consigned to the furnace. In this way a large portion of the decay of petals and other floral parts will be obviated.

Botrytis is able to gain a foothold within the vigorous leaves, particularly when some petal or other floral organ already infested with the gray mould falls upon the leaf and remains there. The fungus therein spreads from the petal to the leaf and shortly a blotch is formed upon the leaf, which continues to spread for some time, and possibly the decaying leaf in falling upon another will continue to spread the disease.

Fungous Diseases of Variegated Plants. Many of the indoor foliage plants are subject to blights of various sorts, but limited time will permit only a word under this head. It may be stated as a general principle that variegated foliage is more subject to attacks from fungi than the ordinary green leaves of plants of the same species. Thus the *Ficus elastica* var. *variegata*, while it may possess added attractions on account of the lack of chlorophyll, for the same reason is more susceptible to blights than the ordinary plants. Variegated Pelargoniums are apt to suffer from fungous attacks while the green leaved sorts go free. In like manner the day lilies, like the *Funkia undulata* var. *variegata*, are often worthless, and in such plants as the Aspidistras, where large white stripes run through the leaves, the fungi are much more apt to attack the etiolated parts. In short, gardeners are getting shy of variegated plants, because such have an evident tendency to blight.

Fungi of the Seed Bed. Passing now to the nursery department of the plant establishment, we find the seed bed is not exempt from fungous enemies. The leading trouble passes under the common name of "damping off," which is a general expression for a failure of the seedlings to maintain a stand. There may be many reasons for a failure at this point, but the chief one is the presence, in the tender tissue of the young sprouts, of microscopic

fungi of the genus Pythium, the *P. De Baryianum* Hesse., being the most common one. This fungus often attacks the plants with so much vigor as to sweep them off in a short time. In structure the Pythiums are quite similar to the mildews of the deeply seated type and are perhaps still more nearly related to the fungus causing a fatal rot of the round potato, the celebrated *Phytophthora infestans* De By.

Several other fungi may attack seedlings; in fact they are subject to the whole list of parasitic enemies that the host is subject to in its later life. The whole matter of seedlings and their relation to fungi is a theme in itself sufficient for the hour. Often the seed contains the fungus within itself, and as it germinates the parasite starts into activity, and ruins its subject. Again the germs are in the soil and pass from thence to the victim. It is not unusual for a fungus to spread from a central point in all directions through a seed bed, killing all plants as it goes.

Fungi of the Cutting Bench. Much of what has been said concerning the seed bed holds true of the cutting bench. Slips are portions of plants which are placed with one end in the moist sand, and have nearly the same conditions surrounding them as seedlings. They are subject to the attacks of "damping off" fungi coming from the soil, and in addition to this carry with them from the parent plant many hidden seeds of decay which under the new conditions may develop and ruin the slips. In the cutting bench therefore many fungi show themselves which are often only obscurely seen in the stock plants. Thus rose cuttings fail, because the stock has the Black Spot or the Anthracnose, the carnations damp off from the rampant growth of the Dark Stem-blight, and violets fail from the Leaf-spot fungus taking possession of the cuttings. Pelargoniums are stricken down with a blackening bacterial blight, and hosts of other sorts of cuttings fall under the influence of moulds of various sorts.

Remedies for Fungous Diseases. This paper upon Fungous Diseases would be incomplete from the standpoint of the floriculturist, without some words upon the subject of remedies. It is here that information is needed by everyone, and no one appreciates the lack more than those who desire to instruct. Naturally enough the diagnoses of the diseases have gone ahead of the remedial measures. It is the hope that in the near future more time will be given to the actual treatment of fungous troubles. Hospitals are

needed where sick plants may be cured, and thereby ways and means devised for the benefit of practical growers, who in turn will nurse their own ailing plants, or, better still, be able to foresee the enemy and avoid him. If one may be pardoned the expression, the best way to cure a plant is to preserve it in health.

The conditions which are provided for the best growth of greenhouse plants are those that favor the development of the fungous enemies. As a rule they thrive best with plenty of heat and moisture, therefore a greenhouse, other things remaining equal, will be the place where blights of all sorts may be expected. It is well known that the means of propagation is through the transfer of the fungus itself or its spores produced in countless numbers. The preventive measures are, first, to start new plants with healthy stock either from seed, or slips free from the disease; second, to prevent the germs of decay from entering the healthy plants, and third, if they are present to check their growth as much as possible.

Strong healthy seed is a very important starting point, the necessity of which is not always fully realized, but this is not the time to dwell upon this fact. In like manner cuttings should be from the best possible stock. If the seed and the slips were healthy, the only point necessary for continued vigor would consist in keeping out the germs, and surrounding the plants with the best conditions for growth. The latter the propagator is supposed to do. The germs enter from the soil or the air or both. Care should be exercised that the seed bed be germ free, and to this end the wood work of greenhouses needs to be fumigated and cleaned as frequently as possible. The soil is a ready receptacle for receiving spores and soon gets charged with them, therefore a frequent change of soil is important.

After everything has been done along sanitary lines for the good health of the plants, namely the use of healthy seed in healthful surroundings, there are some matters that still may need attention. Fungicides have their place in the greenhouse as well as in the orchard and garden. There are a few germ destroyers that when properly used have paid handsomely.

With roses, the mildew may be controlled by sulphur, either dusted on the foliage or heated upon the greenhouse pipes. The Black Spot has been materially checked by the Bordeaux Mixture and Cupram (Ammoniacal Solution of the Carbonate of Copper). In the Bordeaux Mixture, freshly slaked stone lime is combined with

sulphate of copper (blue stone) and applied as a thin wash with a spraying pump. The formula is five pounds each of the lime and sulphate of copper, to fifty gallons of water. The milk of lime may be made up and kept in stock to which the sulphate of copper, also kept in solution, may be added as desired for spraying.

The chief objection to the use of Bordeaux Mixture in the greenhouse is the bluish lime coating it gives to the plants. On this account Cupram is better. The formula for this latter is five ounces of carbonate of copper dissolved in three quarts of strong (4 F) ammonia, to be afterward added to fifty gallons of water. A convenient way to keep this compound is in the concentrated solution in a well corked bottle. Thus a bottle holding the three quarts of ammonia can receive the five ounces of copper and stand ready for use, it being necessary only to pour out an ounce for each gallon of water used for spraying.

These two fungicides are the chief ones that can be recommended for fungous troubles of the greenhouse. A solution of Potassic Sulphide, a half ounce to a gallon of water, has proved particularly beneficial with carnation diseases. This sulphide readily dissolves in water and is easily prepared and kept for use.

Good results have followed the use of the Bordeaux mixture for violet troubles, and many other plants grown under glass would doubtless be equally benefited by its use.

The work against injurious fungi must be preventive instead of curative, and the old saying that "an ounce of prevention is worth a pound of cure" is nowhere more applicable. It is often true that the enemy gets so far along with its destructive work that it is the part of wisdom to destroy the plants instead of trying to save them, much less propagate from them. Fungicides are most useful at the time of attack of the fungus and, therefore, often need to be used before the parasite shows itself. It is most likely that greenhouse plants generally would profit by a spraying now and then, and a more general use of fungicides is to be looked for by growers of ornamental plants.

The man who keeps his plants in the best way, observing the proper conditions of seed bed, soil, air, and food supply, the one who has all things neat and clean, will also be the one who sprays. He will not delay until the plants are sick through and through, but will use the fungicide as a shield for plants while healthy. Such an one will have the greatest pleasure in his plants and be most largely rewarded by them for his watchful care.

Discussion.

W. D. Philbrick asked whether Professor Halsted had ever used extremely diluted Sulphate of Copper,—one ounce of the sulphate to one hundred gallons of water?

Professor Halsted answered that he had no doubt that the proportions named would be useful in many cases. He said that fungicides were frequently used too strong, as experimenters found to their cost. He had an acre of plants on which to experiment. In his trials upon beans he used Bordeaux Mixture of three degrees of strength. The full strength kept off the fungi, and the leaves retained a good color, but the plants were stunted in growth, attaining no more than half the usual size of the variety. With the strength reduced one-half, the good effects were quite as evident, but the dwarfing was still considerable. Reduced to one-quarter of standard strength, the mixture thoroughly protected the plants from fungous injury, but still prevented full development. This trial showed conclusively that fungicides are generally used too strong; next year still weaker solutions will be tried. Fungous spores will not germinate in water in which even a small quantity of copper filings have been kept, and this without any sulphuric acid, or any other corroding agent, than the supposed pure water contained. The greatest success with fungicides is secured when they are put in the right place at the right time.

Charles J. Dawson inquired what should be done to prevent "damping off" in the seed pan.

Professor Halsted replied that while the question is an important one, the attention of the station officers had not been so specially called to it as to many others, and therefore but little is as yet known about it. He did not see why the soil should not be sprayed as well as plants; nor why hot water could not be used — not so hot as to endanger the plants, but sufficiently so to kill the fungous threads, which cannot endure a very warm bath. He knew that young ferns had been so treated successfully. He suggested that possibly Bordeaux Mixture, if sufficiently reduced in strength, might prove more advantageous.

Jackson Dawson said he had tried some chemicals but was more successful with quite hot sand. Still, he thought seedlings could be saved quite as well by washing out the soil in which they were started, and pricking them out in purified soil.

Kenneth Finlayson desired to learn how it was that rusts attained such headway before their presence was detected.

Professor Halsted said in reply that the rusts develop within the plants they attack, and usually go all through before producing any spores. The spores are then produced upon the surface, but the host plant is already ruined. However, spraying the whole body of plants, as soon as the rust appears, may prevent the spread of the disease through the crop, by destroying the spores before they are distributed from the first diseased plant. Many fungous diseases are somewhat local and can be readily removed, but rusts are deep-seated. Spraying at short intervals is the best preventive of the spread of most fungous diseases.

Charles J. Dawson had noticed a kind of rot upon the stems of some plants, and asked if such blemishes were caused by fungi.

Professor Halsted in reply stated that bacterial diseases attacked the crowns of violets, and probably some species begin their destructive work upon the stems of other plants.

BUSINESS MEETING.

Saturday, February 2, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

Charles E. Richardson read his annual report as Treasurer and Superintendent of the Building, which was accepted and referred to the Committee on Publication.

Henry L. Clapp, from the Committee on School Gardens and Children's Herbariums, read a supplementary report, giving an account of the Garden connected with the Robert G. Shaw School, by W. E. C. Rich, Principal. This report was accepted and referred to the Committee on Publication.

Edmund Hersey, Chairman of the Committee on Large, Old, or Otherwise Interesting Trees in New England, read a report from that Committee, and also presented a bound volume of photographs and descriptions of such trees, prepared by the Committee. On motion of William C. Strong the report and the book were

accepted, and it was voted that the Committee remain in office, and be requested to continue their work on the subject.

The President appointed William P. Rich a member of the Committee on School Gardens and Children's Herbariums, in place of T. Otis Fuller, who had declined to serve.

The President also announced the Committee provided for at the last meeting of the Society, to consider the expediency of placing the property of the Society in the hands of a Board of Trustees, as follows: William C. Strong, William H. Spooner, and Walter Hunnewell.

The following named persons, having been recommended by the Executive Committee as members of the Society, were, on ballot, duly elected:

Dr. Daniel D. Lee, of Boston.
John C. Haskell, of Lynn.
Fred. W. Fletcher, of Auburndale.
Mrs. Clara E. Sears, of Boston.
Hon. Charles W. Hoitt, of Nashua, N. H.
Harry Burnett, of Southborough.

Adjourned to Saturday, March 2.

MEETING FOR LECTURE AND DISCUSSION.

The following paper was read by the author:

Hardy Plants and Shrubs and their Arrangement.

By J. Wilkinson Elliott, Landscape Architect, Pittsburg, Pa.

It must be remembered that my experience has been with a more western civilization, and some of my remarks may not have much force addressed to so enlightened a gardening community as that of Boston and its suburbs. Yet I am told there are some people in this neighborhood who persist, and at considerable outlay and trouble, in using thousands of tender bedding plants to make poor representations of inanimate objects. If this is true they cannot make the plea of not knowing better, for all about them are many of the best and most tasteful gardens in America — splendid examples of garden schemes in which the so-called bedding plants cut little or no figure.

There has been so much written and said on the subject, and the great advantages of gardening with hardy plants and shrubs are so apparent, as compared with tender bedding plants, that it seems a waste of time and words to make any argument in favor of one and against the other, but the argument is needed as much as ever, for it is an undeniable fact that nine-tenths of the ornamental gardening in America is still done with a few commonplace and uninteresting bedding plants. Think of the pity of it, that all this enormous annual expenditure should be wasted — an expenditure that leaves our gardens in the fall exactly as it found them in the spring, bare earth and nothing in it.

Is it because the people prefer bedding plants to hardy ones? You who know hardy plants know that this is not so. Who would prefer, let us say, a bed of coleuses or geraniums to a fine group of rhododendrons, or azaleas, or Auratum lilies, or Japanese anemones, or to the hundreds of fine things to be had in hardy shrubs and plants? Any one of these has a beauty incomparably greater than can be produced with the most lavish use of bedding plants. Then the bedding plants are a yearly expense, while an investment in hardy plants and shrubs returns the investor an annual dividend in increased size and loveliness. Every dollar spent for them secures a permanent addition to the garden, and the time soon comes when the annual outlay can be devoted entirely to care and culture.

I know a gentleman who carried a fine stalk of Auratum lily flowers into the office of one of the largest business houses in our city. Not a man in the office knew what it was, and all were unwilling to believe that it grew in his garden. They supposed it to be some rare and costly flower grown in a conservatory. Yet Auratum lilies and dozens of other things as fine can now be bought as cheaply as bedding plants.

The people do not prefer bedding plants to hardy ones. They have no choice in the matter. They buy what the local florist offers and what they see in their neighbors' gardens. They are not sufficiently interested to make inquiries. They do not read the gardening papers, and with few exceptions the managers of the city parks, who should be such educators of the people in gardening, are content with what might be called an annual pyrotechnical display of bedding plants as it is of such short duration and little artistic value.

The popularity of bedding plants is happily on the wane; it occurs to almost everybody after a time that they do not get much for their money when they buy this sort of material, but I cannot say that hardy plants are gaining much. There is no considerable effort made to attract the public attention to their merits, and when some man, more enterprising than his neighbors, does take the trouble to hunt them up and do his gardening with them the result is not always happy. He is very apt to use them as he would bedding plants — that is, in formal beds cut out of the grass of the lawn. Of course hardy plants do not lend themselves to this treatment, and it is one of their greatest merits that they do not. Better no flowers at all than that the lawn should be cut up in formal beds for their accommodation.

An objection often urged against hardy plants is their short duration of bloom, but this really is one of their greatest merits. Let us consider the garden that depends exclusively upon bedding plants for its decoration. It is usually the first of June before they can be planted, and it is well into July before they are effective, and often by the end of September they are killed by frost, and every day during their short season of three months they are as unchanging in appearance as the carpets in our houses and about as interesting.

On the contrary, the well planned and well planted garden of hardy plants begins its season with earliest spring and terminates it not with the first light frosts of fall but when November brings some real winter weather, and then only goes to rest to delight us afresh with the coming of another spring. Almost every day throughout its long season the hardy garden is changing with the changes of the season, something new is coming into bloom, and before it becomes monotonous its season is over and its place taken by some other flower equally beautiful and interesting but entirely different. Our garden is never tiresome, its past is a pleasant memory, its future a delightful anticipation, and its bloom an accurate calendar of the seasons. Is this true or only fanciful writing? It is true, every word of it — hard but pleasant facts.

Snowdrops are in bloom with the first pleasant weather in spring; last spring they were in bloom during the first week in March. They are quickly followed by scillas and crocuses, and then comes the season of tulips and narcissuses, with their count-

less varieties. What a variety of form in the narcissuses! What a wealth of colors in the tulips! Their season is fully a month, and before it is done the early flowering herbaceous plants are showing bloom, and the flowering shrubs have begun a display that will end only with fall. By May scores of hardy shrubs and plants are in bloom — creeping Phloxes, Columbines, Doronicums, Oriental Poppies, German and Siberian Irises, and in shrubs, Lilacs, early Spiræas, Japan Quinces, Magnolias, and Mollis and Ghent Azaleas, and we must not forget the hardy climbers, of which the Clematis, in its numerous splendid varieties, covers a season of fully six months and with which alone a most charming and interesting garden could be made. June brings such a wealth of bloom that we are at a loss as to what to use and what to reject. Rhododendrons in many varieties and colors, Kalmias, Candidum and Elegans Lilies, and hardy Roses are the flowers, perhaps, that hold the greatest share of our admiration at this season, and if June gave us hardy roses alone, our garden should be satisfactory. The memory of a fine collection of hardy roses in full bloom is worth more than all the ribbon and carpet beds ever devised, and and in saying this, it is with full knowledge of the much advertised rolls of carpet, vases, worlds of flowers, etc., with which South Park delights the citizens of Chicago.

I fear that much of the benefit of the example of Mr. Olmsted's and Mr. Codman's work at the World's Fair was lost. It was so well done and so naturally done that a majority of the visitors never suspected that a landscape gardener had been employed.

After the glorious beauty of June we might be content to have our garden tame for a month or two. But there is no need for tameness. At the beginning of July the magnificent Japanese Irises are in bloom, than which there is nothing finer. Wealthy men build and maintain glass houses at great expense to shelter things not half so fine. After the Irises come the Japanese Lilies, and with a little management these will give a brave show of bloom throughout the summer and fall until frost comes. To carry us through the summer we have also tall Phloxes, Yuccas, Rudbeckias, Gaillardias, Tiger Lilies, Hollyhocks — single and double — Campanulas, Rugosa Roses, Day Lilies, Althæas, Hydrangeas, Tamarix, hardy Sunflowers, and a host of other good things that the time at our disposal will not permit us to consider. That is one trouble with a paper on hardy plants and shrubs; a

list of the desirable varieties would make a long article and that without any comment.

And when fall comes we have still some of the best flowers in reserve, notably the Japanese Anemones and the old-fashioned and really hardy Chrysanthemums. The flowers of both these good things will endure the early frosts and early snowstorms and delight us with a show of bloom on such sunshiny days as we may be favored with in late fall.

It may be thought that to win my admiration a flower must be hardy. Nothing of the sort. Certainly the basis of all good outdoor gardening must be hardy material, but the skillful gardener or amateur will find a place for many tender plants, and especially for the so-called summer-blooming bulbs, such as Gladioluses, Dahlias, and Tuberous Begonias, all of which are easily wintered in any dwelling house, and he will even find a place for the new large flowering Cannas, but that place is not in isolated beds on the lawn. I have seen them used to the best advantage in small groups in the margin of a shrubbery where the full benefit of their really fine coloring was gotten, but their stiffness and ungracefulness concealed. And the many fine annuals which are so cheaply and easily raised from seeds are not to be overlooked—*Phlox Drummondii*, Sweet Peas, Asters, Calliopsis, are all fine, and I am free to confess that there are but few things among hardy plants that I admire more than a fine mass of tall Nasturtiums.

The most important thing we have to consider in connection with gardening hardy plants and shrubs is their arrangement. We must study to produce a pleasing effect at all seasons and to have a succession of bloom so that the garden will never be dull or uninteresting. First, let us take the smallest garden that we can hope to make a gardening success with, that is, a fifty foot city or suburban lot. This is a lot usually considered too small to do much with in a gardening way, yet it is the lot owned by thousands of well-to-do and cultivated people, and well worthy of consideration. I can best illustrate a good arrangement for such a lot by describing a garden in my neighborhood. The lot is fifty feet front and one hundred and twenty feet deep to an alley. A path leads from the sidewalk to the steps of the front porch; thence around the west side of the house to the steps of the kitchen porch, and thence straight out to the alley.

The house is thirty feet from the street line. The owner of the lot believes with me that every garden should be enclosed, and has selected as the most desirable enclosure a hedge of California privet, which furnishes him a background of verdure to set his flowering plants against. He has had some difficulty in establishing a portion of the hedge immediately between his house and those of his neighbors, on account of the shade, but has overcome it by extra culture, and deep trenching and draining. The plan of his extremely simple but effective garden is as follows: a border has been made entirely around the house except at the entrances, varying from one to three feet in width. The front porch is covered with Halleana and Golden Honeysuckles, *Clematis Jackmanni*, *C. Henryi*, and *C. paniculata*. The borders in front of the porch are planted with *Eulalia gracillima*, Erianthus, *Funkia Sieboldiana* and *F. subcordata* — the Funkias in front of the Eulalia and Erianthus. As all these plants are grown for form and foliage they are effective throughout the season. A group of Tuberous Begonias is also introduced in this border, and of course has to be planted every season. The border on the east side of the house is quite shaded, and consequently is planted with shade-loving plants, principally native Ferns, with groups of native Cypripediums, Trilliums, Lilies-of-the-valley, Tiarellas, and a large group of Lancifolium lilies at the end of the border where there is the most light. The garden back of the house is almost fifty feet square, but one side is perhaps sixty feet on account of the shape of the house. This garden is completely enclosed by a border, except where it is broken by the necessary path. This border, commences west of the kitchen porch steps, and follows the line of the house until it reaches the division between the front and back garden; it then crosses to the hedge, which it follows, so that there is a flower border in front of all the hedge back of the line of the house. This border is five feet wide except on the west side of the lot, where the entire space, about seven feet, is taken up, except a narrow border of grass between the shrubs and the walk. This space is planted with fifty hardy roses, mostly Hybrid Perpetuals, in thirty of the best varieties. In front of these roses is planted a narrow border, about ten inches wide, of various narcissi; among the roses, gladioli are planted every spring. The remainder of the border is planted with herbaceous plants in groups, with a selection that secures a

succession of bloom. This selection includes Columbines, Japanese Anemones, Irises, Lilies, Pæonies, German Irises, *Helianthus lætiflorus*, *Coreopsis lanceolata*, Gaillardias, *Rudbeckia hirta*, hardy Asters, Campanulas, Phloxes, Delphiniums, and *Heuchera sanguinea*. In front of these is a narrow border of Tulips, Narcissuses, Millas, etc., which is carpeted with *Phlox subulata*. Room is also found for some Sweet Peas, *Phlox Drummondii*, and Nasturtiums.

The kitchen porch is covered with Honeysuckles and Clematis and the brick wall of the house with *Ampelopsis Veitchii*. At one corner of the house is planted a Chinese Wistaria which is trained upon a single wire to the top of the house and then along the eaves. The necessary but usually unsightly posts for the clothes line, are converted into a charming feature of the garden in this way. For the posts, locust saplings about eight inches in diameter with the branches shortened back to five or six feet have been used. These are covered with Halleana honeysuckle, Trumpet creeper, and *Clematis paniculata*, one over each of three posts; and Golden honeysuckle and *Clematis Jackmanni* together on the other. As the space for flowering shrubs is extremely limited only the choicest are used — a *Magnolia stellata* and a Red-Leaved Japanese maple in the front garden, and a *Magnolia Soulangeana*, a *Magnolia conspicua*, and a Japanese Snowball in the back garden. The magnolias will in time become too large for the garden but it will be many years, and the owner is content, for the sake of their great beauty, to cut them out and replace them with smaller ones when he must.

In addition to all this planting, the lawn is filled with Crocuses, Scillas, and Snowdrops, a very pleasing way of using them.

This garden is the most effective, beautiful, and interesting in the neighborhood, yet is made on a lot usually considered too small to have gardening possibilities. It cost more than most gardens of this size but it is complete; nothing more need be bought; on the contrary the overflow of the natural increase is brightening the gardens of neighbors and friends. This garden has also privacy, which I hold is as desirable in a garden as it is in the living rooms of the house.

Suburban lots of one hundred and fifty feet frontage, and from that to an acre or two acres in extent are popular sizes in this country. Such lots admit of a combination border made with

hardy shrubs and plants — one of the most attractive ways in which they can be used. Such a border will vary of course in size, shape, and formation, with the requirements of individual places and must be designed to suit them, but let us suppose a lot of one hundred and fifty feet frontage, and two hundred feet depth, with an eastern exposure. The house is placed midway in the lot and only far enough away from the northern boundary to permit of a screen of planting. It is common to place the house as nearly in the centre of the lot as possible, but a mistake, for such a location reduces the size of the lawn and the gardening possibilities greatly. We would occupy the entire southern and western boundaries of the lot, and perhaps a portion of the eastern, with the border, which should vary in width from five or six feet up to twenty feet, with a curved outline on the lawn. This border should be planted principally with shrubs arranged in groups, but a few trees such as Birches, Magnolias, and Judas trees should be used, and a few evergreens, such as Retinosporas and quite a number of evergreen shrubs. Where a great variety of hardy plants is desired the entire margin of this border might be filled with them, but a more effective arrangement is to plant them in bold groups, one variety in a group, and alternating them with groups of shrubs. Some of the stronger growing plants such as Sunflowers, Foxgloves, and single Hollyhocks might be placed in the middle or back part of the border, and the Japanese lilies,— Auratum, Rubrum, and Album,— and our American species, Superbum, can always be planted in, and combined to advantage with, groups of rhododendrons and azaleas. After such a border is completely planted with shrubs and hardy plants there will be many opportunities for introducing colonies of spring flowering bulbs,— Tulips, Narcissuses, etc.— and the advantage of using bulbs in this way is that the planting is permanent and they are really more effective than in formal shaped beds cut out of the lawn. It is the intention to keep this border in a cultivated condition, free from weeds and grass, and to give an annual mulching of manure. A lot of this size, planted so densely on its boundary, should have its lawn kept quite free and open and have only a few choice specimens planted on it and no large trees, except street trees on the edge of the sidewalk.

I do not claim that this is the most artistic arrangement that can be made for a small suburban place. I have in mind a most

artistic place that is almost enclosed by a quite narrow planting of ordinary trees and shrubs, with a mass of trees back of the house and a single magnificent specimen tree on the front lawn. This is a satisfactory arrangement, as an example of fine architecture is satisfactory, but all the variety, interest, and pleasure of gardening is lost.

In larger grounds, where a vegetable garden and perhaps an orchard are features, the opportunities for using hardy shrubs and plants are much greater and more varied. The vegetable garden may be made the most interesting and delightful place imaginable. Usually it is simply a field of vegetables fully exposed from all points of the ground and very often unsightly. Now the vegetable garden should be concealed from the lawn and house, and this necessity at once suggests a border, or boundary planting, of shrubs and herbaceous plants as described for the smaller suburban lot. This planting should not only hide the garden but should hide its outlines, which are usually rectangular. The garden itself should be enclosed with a hedge, which should show from the inside of the garden but never from the lawn. California privet makes a very satisfactory garden hedge, but where that is not hardy, hemlock spruce can be used. Nothing makes a finer hedge than this, but it is slower growing than the privet, of which I have seen a perfect hedge five feet high made in three seasons, starting with two year old plants. A convenient walk from the house should pass through the shrubbery into the garden, and of course a convenient entrance will be made for bringing in manure, etc. A walk should be laid out all around the garden five to six feet wide, with a border for flowers six feet wide between the walk and the hedge. There should be also two walks six feet wide crossing each other at right angles and dividing the garden into four rectangular pieces of about equal size. On both sides of these walks, Grapes, dwarf Pears, and small fruits can be planted and also on the inner sides of the outer walk, if desired. The walks can be made of any material that is convenient, and need not be expensive. In one garden that I know, they are made of grass and kept as a lawn would be. I know that there are objections that can be urged against grass walks, but the owner of the garden in question does not find them objectionable, and they are certainly more pleasing to the eye than gravel walks. The border between the walk and the hedge should be given up

entirely to flowers; hardy plants should predominate, but there should be liberal spaces reserved for summer-blooming bulbs and annuals. In the hardy plants each variety should be grouped and as many sorts used as thought desirable, but in making a selection flowers suitable for cutting as well as for making a garden effect should be preferred. Such bold and striking plants as single Hollyhocks and Foxgloves should be planted in decided masses, and a border with eastern or southern exposure should be used for hybrid perpetual Roses.

A vegetable garden, arranged as described and properly cared for, in addition to being an interesting and pleasant place to visit, would furnish an abundant supply of cut flowers for the house, for the church, for the hospital, and for friends, and I think one of the keenest pleasures a garden can afford is the ability to give away flowers without stint, and the garden of hardy flowers enables one to give away plants as well as flowers, for the natural increase soon makes a surplus.

In large grounds there are often opportunities for using hardy plants and shrubs in a freer and more picturesque way than any I have suggested; that is, the planting of them in groups and masses to produce the same effects as if they were growing wild. Indeed, after the first careful planting, they should be allowed to grow wild without culture and uncontrolled. The naturalizing of hardy material does not mean that we should attempt to imitate the thickets, woods, or meadows, on our lawns. It does mean the taking advantage of a brookside for groups and colonies of Irises, Narcissuses, hardy Ferns, the splendid Superbum lilies, and the scores of beautiful things that will thrive in the grass if it is not to be cut with the lawn mower. It means the planting an irregular group of Foxgloves on the edge of a wood, or the covering a rough bank with a mass of Kalmias or native Azaleas or native Rhododendrons or with all of these shrubs together. It means the increasing the beauty and interest of the wild and rough parts of a place an hundred-fold, but considerable taste and knowledge of materials are needed to produce good results.

We must not overlook the claims of climbing shrubs and plants to our consideration. No gardening scheme, large or small, should ignore them. We can imagine a most delightful garden where they, in connection with trees and shrubbery, alone are used; and, if we consider their decorative effect, foliage, gracefulness of

growth, and the great beauty of flowers that many of them have, we must admit they are entitled to a more important place in our gardens. The free use of the Clematis family alone would give a thousand-fold more beauty than is obtainable with the most lavish use of bedding plants, and here we not only consider the large flowered type but the smaller flowered sorts as well, with their luxuriance of growth and their charming effect, when used as tree, shrub, hedge, or fence drapery. And then the Climbing Roses — what a glorious possibility here, with their showers of bloom in June.

Climbers will not exhibit their best charms if trained in a stiff and formal manner; they must, in whatever position used, be allowed to grow untrammeled. My neighbor's garden furnished a good illustration of this. He planted common Morning Glories all about his porch, with the intention of training them on strings later, but he was diverted from his intention and the Morning Glories were allowed to grow as they would. The effect was most charming; they clambered over every shrub they could reach, shared a trellis with a Clematis, and, where they could find nothing to climb on, formed mounds of green of the most tangled and pleasing description. Morning Glories, common as they are, if used rightly, produce the most delightful effects. One of the right ways is to sow them among tall grass, or among low bushes and shrubbery, and as they renew themselves annually from seed they may properly be considered hardy. As a rule vines should not be trained in a formal manner. If you would have them exhibit their best graces they must be allowed to grow uncontrolled. All know the uses that vines are commonly put to — that of covering the walls of the house, furnishing shade for porch or arbor, and the covering of screens and trellises. Besides these, almost every place of any size offers opportunities for their growth in a freer and more natural way that will greatly add to the charm and delight of the garden. Perhaps a neglected shrubbery, unsightly in itself, will afford support for such easily grown things as Honeysuckles, *Clematis Virginiana*, and *C. Flammula*, or the common wild Morning Glory, so plentiful in many places, would be quite at home here. An unsightly fence might be partly concealed and made a thing of beauty with Climbing Roses, Honeysuckles, or Clematises, or an old tree, past its prime and beginning to be unsightly, would be the very thing on which to grow such vigorous

vines as the Aristolochia, Wistaria, Trumpet vine, and the common Virginia creeper. In how many places are seen evergreens in a half dead condition, which only procrastination has spared from the axe, and as unsightly as could well be; but nothing could be better on which to grow the Large-Flowered Clematis, which furnishes a profusion of lovely bloom that no words can describe. Some vines, like the Golden Honeysuckle, planted in the grass, will pile themselves up in masses, and if any shrub is within reach will finally clamber over it, producing an effect entirely pleasing. There is nothing more charming in Nature than the combination of shrub or tree with wild vines. Who has not seen the living canopy of green formed by the wild grape over the top of some tree or the stronger growing shrubs, or how some wild vine converts a thicket of brambles, and an old fence into objects of beauty that the most ambitious gardener might copy?

It is not possible in a paper of this length even to name all of the desirable hardy shrubs and plants now obtainable, but I think it is well to give a list of what I would commend as the very best, taking into consideration their ease of culture, as well as the beauty of their bloom, form, and foliage. I know many would disagree with me as to the contents of this list, but I am confident that the beginner could make no mistake in including any or all of the varieties named in this planting list. I have tried to name these plants and shrubs somewhat in the order they hold in my esteem, but this is a difficult matter, as I am very apt to think the finest thing to be the last fine thing that I have seen.

List of Plants.

Hybrid Perpetual Roses in variety including
Paul Neyron,
Ulrich Brunner,
Mme. Gabriel Luizet,
General Jacqueminot,
Anna de Diesbach,
Magna Charta,
Baroness Rothschild,
Captain Christy, and
Mabel Morrison,
Anemone Japonica alba,
Single Hollyhocks,
Japanese Irises,
Lilium auratum,
Rudbeckia hirta,
Aquilegias in variety,
Yucca filamentosa,
Herbaceous Pæonies — single and double, in variety,
Lilium speciosum,
Helianthus lætiflorus,
Foxgloves,
Tall Perennial Phloxes in variety,

Delphiniums in variety,
German Irises,
Aster Novæ-Angliæ roseus,
Chrysanthemums—old-fashioned hardy sorts,
Iberis sempervirens,
Lilium superbum,
" *Canadense*,
Phlox subulata and the variety *alba*,
Pyrethrum uliginosum,
Sedum spectabile,
Doronicum plantagineum excelsum,
Gaillardias,
Oriental Poppies,
Tree Pæonies,
Eulalia gracillima,
Funkia Sieboldiana,
" *subcordata*,
Arundo donax,
Hibiscus Moscheutos,
Heuchera sanguinea,
Pyrethrum roseum—single and double varieties,
Spiræa palmata,
" *Filipendula*,
Tiarella cordifolia,
Myosotis palustris semperflorens,
Helianthus rigidum,
Campanula turbinata,
" *Mariesii*,
Viola cornuta,
Cypripedium spectabile,
Native Ferns in variety.

Spring Flowering Bulbs.

Narcissus bicolor,
" Horsfieldii,
" Poet's,
" Emperor,
" Van Sion,
" albus plenus odoratus,
" Golden Spur,
" Trumpet Major,
Tulips—early-flowering single,
" Gesneriana—late-flowering single,
Milla uniflora,
Crocuses in variety,
Scilla sibirica,
Single Snowdrops.

Climbers.

Clematis paniculata,
" *Henryi*,
Ampelopsis Veitchii,
Lonicera Halleana,
Clematis Jackmanni,
Purple Chinese Wistaria,
Clematis Virginiana,
" *Flammula*,
Trumpet Creeper,
Golden Japan Honeysuckle.

Shrubs.

Kalmia latifolia,
Rhododendrons (Catawbiense hybrids),
Azalea calendulacea,
" *arborescens*,
Spiræa Van Houttei,

Weigela candida,
Magnolia stellata,
Ghent and Mollis azaleas,
Japan maples in three varieties—
sanguineum, *aureum*, and *atropurpureum dissectum*,
Hydrangea paniculata grandiflora,
Japan Snowball,
Cornus Spathii,
" *sanguinea elegantissima*,
Lilacs in variety,
Tamarix tetrandra,
" *Chinensis*,
Berberis Thunbergii,
Forsythia suspensa,
Exorchorda grandiflora,
Desmodium penduliflorum,
Spiræa Lindleyana,
" *Reevesiana*,
" *Reevesiana fl. pl.*,
" Anthony Waterer,
" *Bumalda*,
" *Thunbergii*,
" *prunifolia fl. pl.*,
Rosa rugosa,
Althæas, Dwarf Single White, Buist's Variegated, and Double varieties,
Japan Quince,
Deutzia crenata fl. pl.,
" *gracilis*,
Hydrangea paniculata,
" *quercifolia*,
Philadelphus coronarius,
Weigela rosea,
" *rosea nana variegata*,
Forsythia Fortunei,
Golden Elder,
Rhododendron maximum,
Andromeda Japonica,
" *floribunda*,
Eleagnus longipes,
Snowberries, white and red,
Prunus Pissardi,
Hypericum aureum,
Ligustrum Ibota,
Upright Honeysuckles.

I have placed hardy roses at the head of the list of plants although they are really shrubs, but they belong in the flower garden and not in the shrubbery. None will dispute their right to the place of honor, but notwithstanding the universal admiration that is expressed for them, they are grown in but comparatively few gardens. It requires considerable effort to have them in perfection, but the results amply reward the labor. I cannot go into cultural directions, but I wish to say, and with considerable emphasis, that in my experience in growing roses, which has been as an amateur, I have found roses on their own roots much more satisfactory than budded plants.

I know that Japanese Irises and a dozen other herbaceous plants have as strong claims perhaps for consideration as the white Japanese Anemone, which has my unqualified admiration. It has

so many good qualities — individual beauty of flowers; great effectiveness in the garden, shrubbery, or border; good foliage at all seasons; a long season of bloom, and flowers that will endure a degree of frost that destroys almost everything else. Its only limitation is that it will not thrive in light sandy soil, but in a heavy, rich soil it grows with great vigor. I have often seen it five feet high and that too in places where it had been naturalized and received no attention after planting.

Why is it that single Hollyhocks are not offered for sale or grown by nurserymen and plantsmen? Surely they are the most stately, picturesque, and decorative herbaceous plants in cultivation, and I have never met anybody who did not greatly admire them, but as far as I know they cannot be bought — not even the seed. The single sorts were always very much finer than the highly cultivated double sorts, whose culture has been made difficult of late on account of the hollyhock disease. On the contrary the single varieties are of the easiest culture, and once established will take care of themselves in almost any location.

Equally neglected are the old-fashioned and really hardy Chrysanthemums, which are still to be found in an occasional garden. I know these chrysanthemums would cut but a poor figure in the exhibitions and florists' windows, but they have far more gardening value than all the hundreds of new varieties introduced in the last few years, which can only be grown in perfection by the skillful florist or by the amateur who has all the facilities of the florist.

The numerous fine exhibitions of chrysanthemums every fall are very enjoyable but I fail to see that they have helped gardening any, except that of a very limited class. On the contrary, outdoor gardening has been retarded by the disappointment of thousands of people who have tried to grow the exhibition pets in their gardens.

In a recent number of "Garden and Forest," Mr. Gerard has very properly called attention to the possible field for the hybridizer in improving really hardy chrysanthemums for garden purposes, and in a later number a writer takes exceptions to his remarks, claiming that the flowers are always damaged by frost and that their habit is straggling and poor as compared with the improved greenhouse varieties.

Now, I think we have all seen chrysanthemums in farmhouse yards and village gardens that have endured for years, and that

have, without any special culture, produced an annual mass of very satisfactory flowers and foliage, and there is no doubt that the flowers of these sorts will go through considerable frost and snow without tarnishing.

These chrysanthemums are certainly useful material for the hybridizer, but for the present we shall be very well satisfied if some enterprising nurserymen will collect from old gardens such varieties as now exist and give us the opportunity of using them in our gardens.

Before I conclude I wish to give aspecial word of praise to my favorite shrub, *Kalmia latifolia*, which is known in Pennsylvania, where it is very common in the woods, as the small-leaved mountain laurel. It is greatly admired as a wild flower, and an occasional unsuccessful attempt is made to transplant it from the woods, but nurserymen have made no attempt to introduce it into general culture, and it is somewhat curious that it is necessary to send to England to get fine specimens of this distinctively American plant. Excepting odor, it has every good quality that a shrub can have — evergreen foliage and good habit, great quantity of durable bloom, extreme daintiness and beauty of individual flowers, and usefulness as cut flowers. If the flowers are cut just as the buds are about to open and placed in water they will last for two weeks in the house, and if arranged with taste nothing is more decorative.

In one of his books Donald G. Mitchell suggests that the Kalmia would probably make an excellent hedge. I have never seen it tried but I am confident that it would — perhaps as fine as the holly hedges in England, and, with a little discretion in trimming, a hedge of it could be made to produce a fine crop of bloom at least every other season.

With nursery-grown plants to start with, the Kalmia is of the easiest culture, requiring no special soil or location, and it is perfectly hardy. Like all evergreen shrubs it should be transplanted in the spring.

All the hardy plants I have named, with two or three exceptions, will thrive with ordinary garden culture, and some of them without any attention after planting, but as they are usually planted where they are to remain for years it would be well to make the initial preparation of the soil for them a liberal one. I usually specify that borders for hardy plants should have two feet of good friable

soil mixed with one-fourth its bulk of rotted stable manure, and that they should be prepared in late summer or fall, and the planting done the following spring. Fall planting of hardy plants is often recommended, but my experience is that many plants are winter-killed after fall planting that are quite hardy after having the benefit of a growing season to establish themselves. Of course special plants require special treatment; for instance, the bulbs of the Auratum lilies should not come in direct contact with manure, and the fine double and single varieties of *Pyrethrum roseum* should be planted in beds raised a few inches, to prevent their rotting out in cold, wet weather.

I would advise the same liberal preparation of the soil for shrubs that I do for hardy plants, though in many instances the expense would be prohibitory or thought so, but in any event I should insist on the ground being subsoiled or trenched and a liberal application of stable manure being made. An annual mulching of manure is beneficial to both shrubs and hardy plants.

I have had a somewhat extended experience with Rhododendrons, and my opinion of the proper soil to grow them in may be worth something. Their beauty is now pretty generally known and appreciated, but they are popularly considered tender and difficult to grow. This is largely owing to the selling of improperly grown plants and tender varieties, and to late fall planting, which is very apt to be fatal. I have found that when Catawbiense seedlings, or the well-known hardy named varieties, grown on their own roots from layers, were planted, there was no difficulty in growing them in any ordinary soil or in any position except immediately under old established trees. I have seen them grown with peat and with leaf mould, but the best results I have ever seen in this country were where an excavation two and one-half feet deep had been made for them and filled in entirely with turfy, fibrous sods, chopped up, and allowed to stand over winter before planting. No manure was mixed with the sods, but after the rhododendrons were planted a mulching of rotted cow manure was applied to the surface of the soil.

It seems to me I have said a great deal about the merit of hardy plants and shrubs, and but very little about their culture, but it must be remembered that my mind is more occupied with the designing of gardens than with their care, and I think it is quite

as important to create an interest in hardy material as it is to teach how to grow it. Cultural skill will soon follow enthusiastic desire, which your Society is doing so much to create, and when we can have horticultural societies of like intelligence and breadth of object in all our large cities the advancement of the best gardening will be rapid.

Discussion.

In reply to a lady questioner, Mr. Elliott said he would not attempt to transplant lilaes which had been growing fifty years. He was decidedly opposed to transplanting either old trees or shrubs. He had observed that the results were always unsatisfactory, and that young vigorous stock planted in extra deep and rich soil always gave quicker and better results.

Henry L. Clapp expressed his strong interest in hardy herbaceous plants and shrubs, especially in the Golden-rods, Asters, Hardy Chrysanthemums, and Clethra. These plants, under culture in the George Putnam School Garden, have given great satisfaction. The *Aster lævis*, which was carefully cultivated, became a mass of flowers. The *Solidago Canadensis* came up in the yard, attained the height of seven feet, and spread out wide enough to fill a hogshead. They had fourteen varieties of Golden-rod and eighteen varieties of Asters. The purple Asters have proved quite successful. One, the *Aster Novæ Angliæ* L., a seedling, made a growth as large as a barrel. Indeed, the unexpectedly large growth and brilliant colors produced by these plants, led many outside persons to inquire about this garden of hardy plants. There is no finer yellow than that of the Golden-rods, and no finer purple than is shown by the *Aster Novæ Angliæ*, and when grown together they make a fine combination of color.

Being asked whether the California Privet is hardy at Boston, Mr. Elliott said he could not answer that question definitely. He thought, however, that it is not reliably hardy north of the latitude of New York.

William C. Strong had seen many hedges of California Privet, that were quite hardy and flourishing; others also that were not. The plant is largely used at Newport, R. I. Its success depends upon a good summer growth, and ripening of the wood.

In answer to a question regarding the disease that destroys many hollyhocks, Mr. Elliott said the disease was confined mostly

to the double varieties. He had not seen any single flowered hollyhocks attacked by it.

Mr. Strong spoke of several evergreens, among them *Kalmia latifolia*. He had nothing to say against the latter. It disappoints many persons, because they do not treat it properly. It is naturally a moisture and shade-loving plant, although after becoming well established it will endure bright sunshine.

Mr. Elliott said that although *Kalmia latifolia* usually grows wild in the woods, the best growth and greatest beauty of flowers of this plant he ever saw was in a space of cleared forest where it had grown up thickly, exposed to the fullest sunshine. He had seen it in a garden, and also in nursery grounds where it was growing better than it usually does when in a wild state. He had found that, like the Rhododendron, the Kalmia likes plenty of sunshine, but also like the Rhododendron it does best in a deep, moist but well drained soil.

Mr. Strong alluded to the fact that it grows on mountains, but water often abounds there; their being exposed to full sunshine under such circumstances is a very different matter from taking them out of their native soil, and replanting them not only in a strange soil but in the full blaze of sunshine.

O. B. Hadwen had taken many of these plants from the pasture, and planted them in open ground in the autumn months from September to November, and lost very few. But he always takes up a ball of earth with each root he transplants. It does not succeed as well in the shade of trees as in clear sunshine, but flourishes best in the trenched ground of a Rhododendron plantation. He esteems the *Kalmia latifolia* highly, and would like to have it selected for the State Flower. No flower surpasses it for a picture. He had been much interested in the paper read today, and took no exceptions to it. But there was one omission he would mention: the old-fashioned red Pæony, which is one of our best hardy flowering plants. He has a bed of it, about ten feet in diameter. They come up annually and produce a most brilliant display, which affords much enjoyment to him.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, February 9, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair. The following paper was read by the author:

GLASS HOUSES, THEIR CONSTRUCTION AND HEATING.

By HENRY W. GIBBONS, New York.

I have the honor of being permitted to present to your attention this morning a paper entitled "Glass Houses, their Construction and Heating." Under this heading come not only such structures as are used for the purpose of raising plants or bloom for profit, but also greenhouses designed both for useful and decorative purposes on private estates; from the small amateur greenhouse for beginners in the art of floriculture, to the imposing ranges of palm and other houses on the estates of men of large wealth.

The owners of greenhouses for either of the above purposes have in the past been continually asking for structures more permanent and economical, more effective for the purposes intended, and more decorative and artistic in design than has heretofore been obtainable. It is today the aim of the leading horticultural architects and builders to satisfy these demands, and I feel gratified in saying that the art of greenhouse design and construction — for it is truly an art — has reached that point which enables us today to construct a house that is as near perfection as we can approach. Of course, in this perfection there are many grades, the grade being decided by the objects for which the houses are intended, the value of the land upon which they are to be built, the amount of money to be invested, and many other considerations.

I shall divide this essay into two parts. In the first, I will call your attention to houses constructed for the use of the commercial grower, and in the second to those designed for private use.

COMMERCIAL GREENHOUSES.

As the primary object of such structures is profit, a great deal of careful thought and consideration is necessary in their design, location, and erection. Competition in floriculture is

today so close and sharp that the grower cannot afford the expense of the continual repairing and rebuilding which was practised under the protection of extravagant profits; therefore we must look for structures as permanent as possible, and at the same time not requiring a prohibitive amount of capital for their erection. The perfect quality of plants and bloom now demanded by the purchasing public compels us to design houses of such shapes and dimensions and so arranged as to location and furnishing in the matter of light and heating and ventilating facilities, as will produce the best results. Thus we see that the vital requirements of a commercial greenhouse are *economy* and *adaptability*. By the expression "economy" with reference to such structures, two distinct impressions seem to be conveyed; one indicating low first cost, which would result in the greatest profits in a short time; the other, which is the more correct impression, indicating the lowest first cost which will result in a reasonable profit for the longest period.

We will now consider the construction of greenhouses coming under this first impression, which, for lack of a better name I will call "Temporary Economy," as against the second impression, which I will name "Permanent Economy."

Temporary Economy. A grower starting in business with a limited amount of capital is compelled to build under the temporary economy style, and the best construction for that purpose is that known as sash-bar construction. Fig. 1, gives a reasonably clear general idea of this style of construction. Posts may be of various woods, such as locust, cedar, cypress, or chestnut, the first being the most, and the last the least durable, and the average cost would be about in the same order. My preference is for cypress, as it is easily procured at a reasonable price, and is of very lasting quality, whereas locust and cedar are in many localities unprocurable, and chestnut is not sufficiently durable for this purpose.

It would be well here to consider the kinds of woods best suited for the complete construction of such houses. I would say, without hesitation, use cypress throughout, but be careful what kind of cypress, for there are various grades of this wood, some of them being of an exceedingly open and woolly nature, difficult to work, and having a tendency to warp and twist, which renders them unsuitable for greenhouse work. I think without doubt the

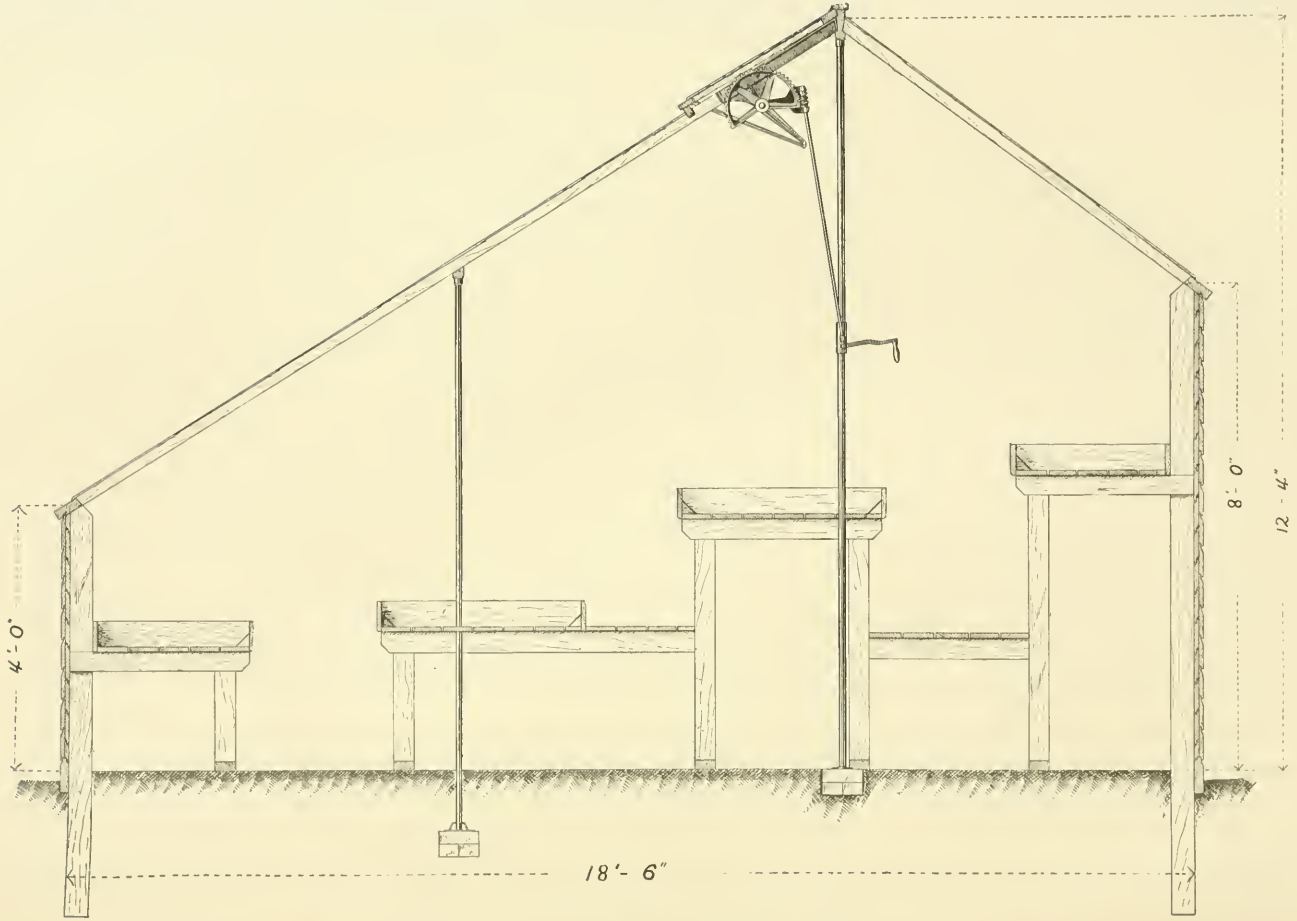

FIG. 1. "SASH BAR" ROSE HOUSE.

best for our work is red cypress — that which comes from the Gulf States, it being of closer fibre, greater strength, elasticity, and durability, and, therefore, much to be preferred to the white cypress of the Central States. Cypress absorbs water very easily, and if well seasoned and air-dried gives it up freely without detriment to the wood, but if kiln-dried the absorption of moisture will be very excessive, and cause much trouble by warping, twisting, and undue swelling of the wood when wet. I would strongly advise those contemplating the erection of their own greenhouses, not to purchase cypress from their local lumbermen, for cypress handled by them if not *always*, is, in *almost* every instance, kiln-dried stock, as this is the only stock in demand by the general building trade for interior finish. I would suggest that you either buy from the producers, emphasizing very positively that what you wish is air-dried and *not* kiln-dried stock, or from some reputable firm of horticultural builders, who carry a stock of sizes and grades best suited for the purposes in view.

We do not know the durability of cypress under the conditions found in greenhouse construction, but we do know that it lasts much longer than any material heretofore used.

Having satisfied ourselves as to the material, we will now pass to the details to be used in the construction of the house under consideration, which is generally known as a Sash-bar house. The most serviceable size of posts for a greenhouse, say about eighteen feet and six inches wide, is two by five inches, and they should be placed from four to four and a half feet apart; in many cases they are placed from six to eight feet apart, with a two by two-inch intermediate post, used centrally between these main posts to give stiffness and nailing facilities for the siding. The posts should extend to a depth of from two and one-half to three feet below the ground line, the depth depending on the nature of the soil, and the latitude in which the houses are being erected. The height will be governed by the purposes for which the house is intended; for ordinary greenhouse purposes, if provided with glass below the eaves, either movable or stationary, the height should be about four and one-half feet above the ground, but if solid board sides are desired, as in the house under consideration, the height of the posts need be only about four feet, and that on the north side of a three-quarter span house eight feet. These dimensions usually give ample height above the

side bench, and allow of good head room in the side path. As wooden gutters should, in all cases where possible, be avoided, they being the first part of a house to rot out and cause all parts with which they come in contact to decay with them,—and these parts of the house are very vital as a usual thing,—we will consider a house without gutters. Iron gutters may be used, but they will come under the heading which I have named "Permanent Economy," and will be considered later. If, however, the rain-water is of such value that the wooden gutters must be used, I would suggest their being made from the solid stick, usually four by seven or eight inches, the gutter parts being dug out, and the gutter attached as an independent part, which may easily be removed from the house at any time without detriment to the structure. The tops of the posts should be cut on a line to correspond with the pitch of the roof, usually seven and one-half inches to the foot, rising at an angle of thirty-two degrees, or, in the case of the north side of a three-quarter span house, about thirty-seven degrees.

The order in which the several parts of a greenhouse are assembled or set together varies with each builder, each adopting that method which he finds gives him the best results. These methods vary with the class of mechanics available, and also with the customs in vogue in the various sections of the country. No set order that I could describe would meet with approval in all sections; so I will proceed only to describe the several details which enter into the construction of the houses, and for convenience will start at the ground line and work up.

We have already described the posts, and will now consider the siding. The first or inner siding should be of that shape known as "beveled ship," its section being such as to make a tight joint, which does not show the effects of expansion and contraction, and principally one which affords no lodgment for water. This siding should be nailed directly to the outer side of the posts, care being taken not to make the joints of two lines of boards one directly above the other on the same posts. The usual practice is to start the upper line with a full-length board, the next with a half length, the next a full length, and so on, downwards. Many use a narrow, tongued, grooved, and beaded vertical ceiling for the inner boards, but I do not approve of this practice, as it creates so many more joints and recesses for the reception of moisture,

which is held in them by capillary attraction, this being in such cases with small quantities of water greater than the attraction of gravitation, thus causing a much more rapid decay than would occur with the use of the beveled ship siding above described, besides not giving the house the longitudinal bracing and stability so very desirable in such a structure.

For the outer siding two patterns of milling are in general use; seven-eighths-inch clapboards, and novelty siding. The latter makes the neater, warmer, and more durable covering. This second, or outer, siding should be divided from the inner by means of some non-conducting material. I think the best for this purpose is a good grade of rosin-sized building paper. A grade weighing about one-twelfth of a pound per square foot would be very well adapted. This paper should be tacked directly to the inner siding, and the outer siding should be nailed directly over this, care being taken to mismatch all joints of each of the sidings, and make all vertical joints over main or intermediate posts. It is a very bad practice to nail to the inner siding only, as the nails will push through and present a very unsightly appearance, allowing moisture to settle on the breaks thus made, and causing rust and premature decay; also not giving sufficient hold to the nail, and allowing the outer siding to be drawn off if it has any tendency to warp caused by the heat of the sun or by outer moisture.

The next detail to be considered is the eaves-plate or, as many call it, the lower glazing strip. Its size and shape vary somewhat under differing circumstances. Its main object is to afford a support for the glass and glazing bars, and make a weather-tight connection between the board sides and the glass roof. A very convenient size and shape for this piece, in the house under consideration, would be six inches by two inches, having on the under side two plow grooves, the lower and larger one being for the reception of the upper edge of the outer siding; the upper one, a small groove about a quarter of an inch square, to act as a break, and prevent the waters of condensation from the roof reaching the siding, the groove causing the water to fall at that point. On the upper side, no special milling is necessary, but the two edges, especially the upper one, should be cut to a slight bevel. This is to give a bearing for the glazing bar. If your wood is being machined in a well-appointed mill, I would also

advise the beveling of the lower edge, so as to reduce as much as possible the exposed surface of this stick, to which the moisture would be liable to freeze, causing ice to back up under the edge of the lower lights of glass and break them.

Next in order comes one of the most important details of the house, the roof glazing bars, or as they are generally called, the "sash bars." The object of these bars is to support the glass, and for this purpose a light section of lumber only is required, its dimensions being governed by the length of the bars to be used without the assisting support of a purlin. I find in ordinary practice, assuming that sixteen-inch by twenty-four-inch glass is being used, for bars having a distance of about five feet between supports, one and three-fourths inch by one and one-eighth inch is ample, and for those whose supports are eight feet apart, two and one-fourth by one and one-eighth inch is well suited, having ample strength for the strain brought to bear upon them, and yet being of such dimensions as to cast but little shade. These bars should have on their upper edges suitable rabbets for the reception of the glass; the bottom of these rabbets being made in the shape of a V as a receptacle for the putty necessary in glazing. A groove is also run in each side of the bar to carry off the water caused by the warm, moist air of the house striking the cooler glass surface and condensing, and thus preventing its falling on the plants and causing injury.

I wish here to call your attention to two very important points to be considered in designing or erecting greenhouse structures: first, avoid as much as possible any detail which will throw shade, and, second, avoid all recesses, mortises, or other places where moisture may find lodgment. Both of these items are of the utmost importance, yet are generally overlooked by the novice in greenhouse building, and I am sorry to say are often neglected by older heads, particularly the latter items,— mortises or other places for lodgment of water. If you desire to use bars which are provided with the groove on each side for the carrying off of the waters of condensation, as just described, be sure that the outer sides of this gutter or groove at the lower end are cut away so as to allow the water to drop out just before reaching the eaves plate, or glazing strip, or entering any joint which may have become opened from various causes, thereby producing premature decay. This small feature of cutting condensation grooves at the

lower end is of the most vital importance, its observance or neglect making a difference of many years in the life of a glass house, and yet I never remember having seen it practised by any other builder than myself.

Next in order we come to the purlin. This may be of wood, about two by three inches if desired, but as the cost of an iron purlin drilled to accommodate the correct spacing of the glazing bars for the proper reception of the glass, is so very little in excess of that of the wood purlin, and considering that the iron will cast much less shade than the wood, I would advise giving it the preference. If an iron purlin is decided upon, and you wish to order from a firm of experienced greenhouse builders, send them a small piece of the bar you intend using, state the size of the glass, and trust them to drill the purlin correctly. They will also arrange for suitable splicing of the iron, and for caps to receive your iron pipe columns, which are necessary to support the purlins. If, however, you desire to do the drilling yourself, or have your local mechanics do it for you, to the width of bar in sight between the rabbets, usually about half an inch, add the width of the glass, say sixteen inches plus one and one-sixteenth inches, for play; this will give you sixteen and nine-sixteenths inches between centres of bars, and this will be spacing of holes necessary for securing bars to purlins. The size of the holes should be three-sixteenths of an inch, which will accommodate the No. 8 round-headed screws. The section of iron best suited for the purlin is two by one and one-fourth inches by one-fourth angle; if this cannot be easily secured, one and three-fourths by one and three-fourths inches by one-fourth angle may be substituted. The size of the columns for the support of these purlins, depends upon the extent of roof they have to support. For the southern slope of an eighteen feet six inches wide, three-quarter span house, one and one-fourth-inch gas pipe will answer, or, for each slope of an even span house of the same widths, one-inch pipe is ample, placed about eight feet apart.

We next come to the header which makes the connection of the roof ventilating sash and the roof. In houses such as we are now considering, I prefer to run all bars up to the roof and fit the header over the bars.

The ridge of such houses as these plays a very important part, as on it devolves the duty of giving and maintaining a true roof

line. Of all the parts of the house, it is most important that the ridge should be of perfectly air-seasoned timber. It should be sawn from a sound log, straight and true to the grain, and free from heart or sap. If you are unable fully to meet these requirements, in cypress wood, which is often difficult, I would advise the use of yellow pine. In fact, in my own practice, I use yellow pine exclusively for this purpose, as I realize the great difficulty in securing a straight line with cypress, under the peculiar exposures and conditions which surround the ridge of a glass house. The ridge should be two by six inch plank and machined as shown, one side being arranged for the reception of the ventilator, and the other for that of the roof glass and bars, as shown. A suitable cap three by one and one-half inches, machined as indicated, is securely fastened to the upper edge of the ridge.

We will next consider the ventilating sash. For ordinary sized houses they should be three feet deep, and continuous on either or both sides of the ridge. The point at which these sashes should be hinged, whether at the top or the bottom, does not admit of much discussion, as each method affords equal ventilating conveniences, and the advantage gained by hinging to the ridge and relieving the bars of the weight of the sash is so obvious that this method is recognized as the standard, although there may be isolated cases in which the geographical surroundings are such as to make the hanging of the sash at their lower edge desirable. But these cases are so few that this method needs no further comment in a general discussion.

The cap described has three objects: first, to protect the ridge, and help it keep its alignment; second, to support the sash; and third, to make the joint between the sash and ridge weather tight. The ridge of a three-quarter span house of the above class requires support by means of one and one-half or two inch pipe columns, or three by three inch wood posts, about every eight to ten feet.

Iron-Frame Greenhouses.

We will now pass to the more important style of commercial construction, which comes under the head of Permanent or True Economy, and is generally known as Iron-frame construction, the object in view being to make as much of the structure as possible practicably indestructible, but at the same time bearing in mind the requirements and conditions which are peculiar to greenhouses.

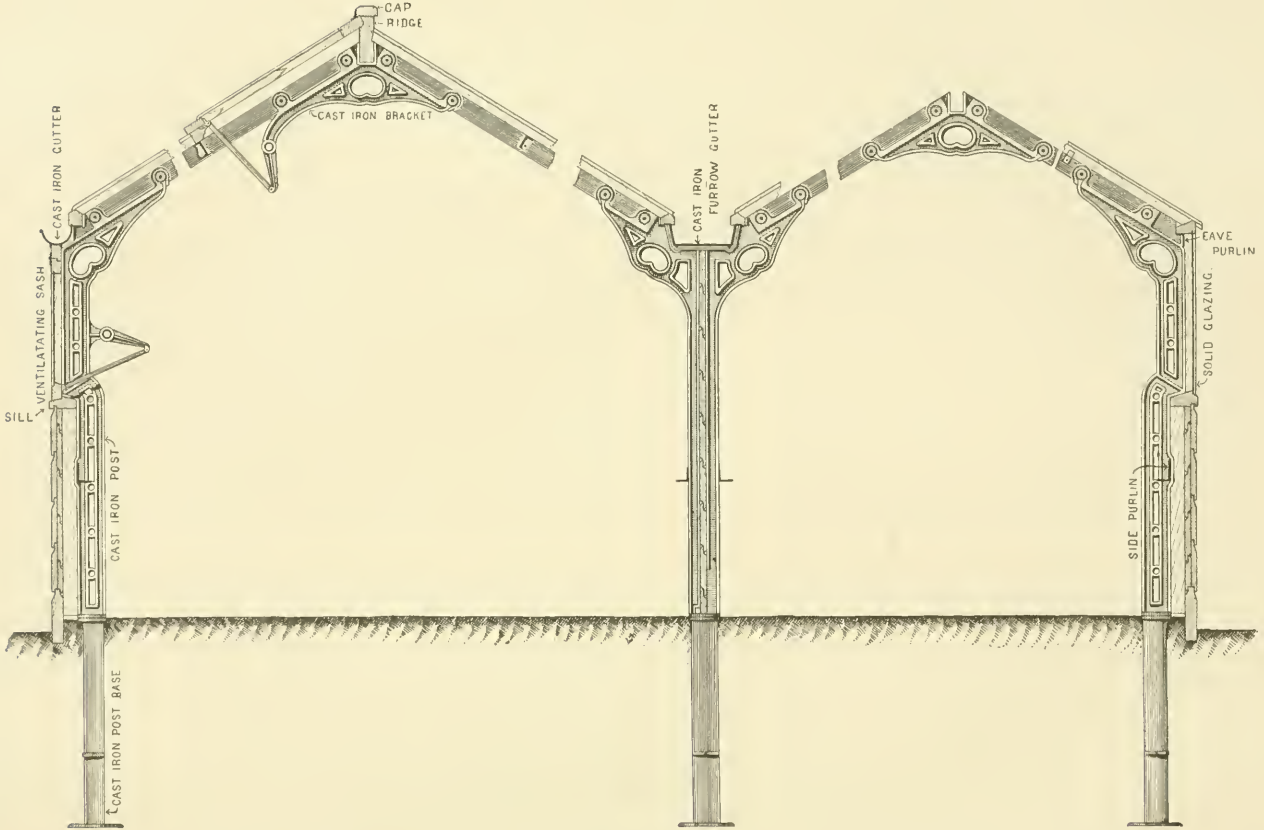

FIG. 2. SHOWING CROSS SECTION AND DETAILS OF IRON FRAME GREENHOUSE CONSTRUCTION.

It is the lack of a thorough knowledge of these conditions with builders and architects in general, that is responsible for the thousands of greenhouses throughout the country which are practically useless for the purposes for which they were built, and has thus caused loss of interest in plant culture, in addition to the loss of dollars, to those who otherwise undoubtedly would have been the means of materially furthering the interest of the public in matters horticultural, and consequently would have helped to create a greater demand for the products of our commercial growers. I mention these facts just here in order to emphasize the advisability and necessity when building glass houses, of first making yourself acquainted with the most perfect methods of construction; and without question, the easiest, quickest, cheapest, and in every way the most satisfactory means of doing this is to consult some prominent and progressive firm of horticultural architects and builders — men whose whole thought and energy are bent in this particular direction.

The details for a perfect iron frame for a commercial house may be seen by Fig. 2. It will be noticed that for the foundation a cast iron post base is used, which may be made of any desired length, according to the nature of the ground upon which the house is to be built. The post bases are usually about two feet, six inches long, and are set into the ground to their full depth, the tops being about on the level of the floor-line of the house. To this base is bolted an iron post, the post in this instance being that used by Messrs. Hitchings & Co. in their improved patented construction. Other styles of iron posts may be used, such as the ordinary angle or T iron of commerce, but care must be taken to select them of such a shape and of such dimensions as will not only support the dead weight of the house but also have no tendency to warp, sag, or twist, in case of strains being brought to bear in other directions than vertically as above stated. The advantage of the cast iron post, in addition to being designed with a view to convenience of attaching other parts of the frame to it, is its great stiffness, strength, and general adaptability.

We will now pass to the rafters. I find in general practice when a suitable bracket is used for connection of rafter and post, and of rafters to each other at the ridge, that where the length does not exceed seven feet between supports, (except in the case of grapery roofs) a section of flat iron two inches by one-half

inch is ample; where supports are from seven to eleven feet apart, two and one-half-inch by one-half-inch iron will serve, and so on.

The rafters are tied at their upper ends by iron brackets which have a recess or socket to receive the wooden ridge already described. I have often been asked why I do not use an iron ridge, and I suppose this question has come to the minds of many present, when considering this subject. An iron ridge is unnecessary, and presents many objectionable features. A wooden ridge and cap of some description are necessary for the weather-tight and proper connecting of the ventilators and roof, and to add an iron ridge, of such dimensions as would give to the building the stiffness and stability that a two by six-inch yellow pine ridge will, would so add to the amount of shadow thrown upon the house as to be prohibitive; it would also entail additional and unnecessary cost. The bracket should also have conveniences for carrying the shaft of the ventilating apparatus. We have then in this bracket a combination of three parts. First, a convenient and practicable tie for the rafters; second, a suitable means for connection between the ridge and the iron frame; and, third, bearings for the vent shaft, combined in one casting, which not only causes a saving of first cost, but a saving of labor in the course of erection.

These pieces comprise the main supporting trusses of the structure, and we will now consider the parts which are requisite for the tying of these trusses or sections together, and for the support of wood and glass on those parts between trusses, which as I have before stated are placed eight feet, four and one-eighth inches apart. This is for glass sixteen inches wide. If narrower glass is used, a lesser spacing of the trusses will be necessary.

The posts are tied together by means of two lines of angle iron purlins, the lower of which is placed about one foot, six inches above the ground, and is of three by two inches by three-eighths inch angle. Its uses are, first, to tie the posts together, and, second, to give support to the two-inch by one and one-fourth inch by one-fourth-inch angle eaves, or gutter purlin and plate above, by means of a light intermediate post connecting the two together. These two purlins so connected give ample support to that portion of the roof below the lower roof purlin; also to the gutter and header supporting the side ventilating sashes. The lower purlin is also used as a back support for the side bench, and thus obviates the necessity for any back legs, or for attaching this

bench to the wood siding and thus causing early decay at such connections.

For the connecting of the rafters, giving longitudinal stability to the roof, and for the support of the glazing bars, two inch by one and one-fourth inch by one-fourth inch angle iron purlins are used. This size of iron is selected, as the two-inch web gives the necessary strength, and the one and one-fourth inch gives sufficient surface for the attachment of the roof bars by means of small screws, yet throws but little shade. These purlins are spaced according to the length of the rafters, and the size of the glazing bars in use, the upper one being so placed as to afford support for the upper ends of the glazing bars, they all resting on the purlin about one-fourth to three-eighths of an inch, and being toe-nailed to the cypress header which is screwed on the purlin.

The ends of the house are braced with one, two, or three lines of purlins, according to the width and shape of the house. Iron doorposts fastened to cast iron bases in the same manner as the side posts, run up to the rafter and are tied together by a cast iron doorsill at the bottom. The end purlins just mentioned run from the end posts and rafters to the doorposts, thus forming a very stiff end, and one to which the necessary light woodwork is easily attached.

We now come to the last part of the iron frame, but I think one of the most important, namely the gutters. The gutters should be of iron, but even that would be of no advantage unless we could prevent their contents from being frozen, for, as we all know, in the process of freezing expansion takes place, which is liable to burst or crack the gutters. I show here, however, a non-freezeable gutter, of cast iron. It is so arranged that a small portion of the inner warmth of the house is conducted to the contents of the gutter, and thus prevents their being frozen. These gutters are in use very largely throughout the country, and I have never known in a single instance of their contents becoming frozen sufficiently to prevent a free flow of water. I have, in very low temperatures, ranging from zero downward, seen the outer surface of the gutter coated with ice, but the warm side is at all times free. This is a very important feature. First, it is a permanent portion of the house, whereas the old wooden gutter was the first part to rot and communicate decay to all its surrounding parts. Second, it prevents the possibility of ice forming

and continuing up the roof between the lower laps of glass, and by its expansion causing considerable breakage. Such breakages are at all times expensive, but especially at such times as this, when the temperature is low and the cold currents of air passing through the broken glass may cause great damage to, or loss of plants or bloom. Third, they provide at all times a free passage for water from the roofs to drains or sewers, or, in many cases when it is valuable for irrigating or other purposes, where a supply of water under pressure cannot be obtained, to suitable tanks or cisterns, built within the houses. They also prevent the unsightly slopping over, which takes place with gutters whose first contents have become frozen.

We will now consider such details in the woodwork in connection with an iron frame house as may be different from those already described in connection with the "All-wood," or "Sash-bar" house. We find first the sill against which the side ventilators close; this is of a shape well known to all, and is cut from a two by four-inch joist, the under side being milled with a plow groove for the reception of the upper edge of the inner siding, and two smaller grooves to prevent water creeping along under the sill inside and running onto the boards. The upper side has the usual rabbet for the sash to shut against, about one-half inch deep, and the surface is beveled to shed water. The side ventilator is of various depths for different purposes; generally about twenty inches, the top rail being rabbeted, as is also the small header which makes connection between the sash and the gutter. This rabbeted joint makes a very weather-tight and close connection. The eaves or gutter strip is screwed to the upper surface of the eaves purlin, and is fitted with a plow groove on the under side, for the reception of the gutter's upper edges, which act as a weather-break. The upper surfaces are beveled, the outer one to the pitch of the roof, and the inner at such an angle as to give support for the foot of the roof bars.

At this point, I wish again to caution you against the very common practice of having mortises cut in the strip for the reception of the roof bars. This mortise and tenon style of connection is very largely used, yet it is without question the feature which leads to the first and most serious decay in a glazed roof, no matter how perfectly we may make the tenon fit into the mortise, or how careful we are to have all such joints painted

before connection. A large proportion of such joints, under the varied changes and strains to which they are subjected, will open, and, be it ever so little, it is fatal to that part of the roof, as moisture will accumulate in the mortise, remain there, and the result will be as I have stated,—premature decay.

The next, and I believe the last, feature of the woodwork, excepting the doorposts, which differs from the construction already described, is the piece known as the roof ventilator header; it is really the roof bar header. The section of this is shown in Fig. 2. It is securely screwed to the purlin, leaving about one-fourth to three-eighths of an inch of surface on the lower edge of the purlin for the support of the upper ends of the roof bars, as before described. It is generally from this purlin that all drip of condensation formed upon the roof-vent accumulates, and falls to the plants below, causing considerable damage, and it is to avoid this annoying drip that we use the peculiar shape of header here shown. The object of the rabbet or groove on the upper side is to collect all drip from the lower rail of the ventilator and by means of small channels cut through to the outer air to carry such water onto the roof. One would expect these channels to become frozen up and useless in severe weather, but such is not the case. The little current of warm air which is allowed to escape through these grooves prevents them from becoming clogged with ice.

Glass Houses for Private Estates.

I think I have considered the construction of commercial houses sufficiently for the present, and as the glazing, painting, heating, and ventilating of both commercial and private structures are the same, I will consider them later under their separate heads, and will now pass to the construction of glass houses designed and arranged for use on private estates.

The construction of such houses differs very slightly from that of the iron frame commercial house just described, the principal difference lying in the fact that they are usually built upon brick or stone walls instead of having posts set in the ground, with the double-boarded sides.

In the past many styles of both solid and hollow walls have been tried, but it is now an established fact that the only wall suitable for greenhouse foundations is a solid one from twelve to sixteen inches thick, according to the weight or thrust it is

intended to support. Great care should be observed in the bonding of such walls. Undoubtedly the best bond for such purposes is that known as "Old English," which consists of alternate headers and stretchers, the objection to this being that as the dimensions of bricks vary in different localities, many are such as to make it difficult for the mason to prevent several vertical joints coming directly over each other, and thus causing a weakness in the wall. This difficulty can, however, be overcome if a little care is exercised and the mason when finding joints overrunning will cut a brick or two to bring joints into the desired position. The next manner is to make every third course of headers; this finds preference with most masons, and gives a good, substantial foundation.

Theoretically, hollow walls are warmer than solid ones, but in practice they are colder and much weaker, and will be found a source of constant trouble and annoyance, unless you are willing to make both sections eight inches thick, which, with the addition of the air space would make a wall twenty inches thick, and besides being very costly, would occupy more space than we should care to devote to such a purpose.

The difficulty with the hollow wall, as ordinarily constructed, *i. e.*, two four-inch walls with a two or four-inch air-space between, is that the action of the elements on the outer wall, and that of the heat and moisture on the inner wall soon cause the joints to crack, thus allowing a circulation of air to take place between the walls, which destroys the looked-for warmth caused by the nonconductiveness of the dead air space, and the variable strains brought to bear by expansion and contraction, heat and cold, dryness and moisture, on the two four-inch walls are such as soon to break all bond between the bricks; and unless the two walls are so tied together as to be practically solid, they will bulge and warp, and endanger the entire superstructure.

I would particularly caution you against the use of a single face of four-inch brick on the outside; if any particular color or make of brick is desired, for the sake of appearance, make the outer headers, as well as the stretchers of such brick, and see that the inner brick are of the same size as the face, or make the entire wall with the special bricks. No amount of wire or metal ties will take the place of brick bonds in a greenhouse wall. This same caution pertains to the facing of the inside walls with white enameled bricks, which give a very nice and clear effect. If such

bricks are desired, see that they are exactly the size of the others you are using, and enameled on such of their several surfaces as to enable you to get one of the bonds above described. A good mortar for greenhouse walls is composed of two parts of clean sharp sand and one of good Rosendale cement.

Upon the foundations, which usually extend above the ground to about two feet six inches, a heavy cast iron sill is set in equal parts of Portland cement and sharp sand. With such a sill, having the centre web below the rabbet which rests on the wall and becomes embedded in the cement, any cross movement of the sill upon the wall is prevented, and no anchor bolts are necessary.

The iron frame of the superstructure, which is in general similar to that already described, is bolted securely to this sill.

The woodwork used upon these houses is of the same general shape and detail as that already described, but is preferably of clear white pine, in order that a higher finish may be obtained, as cypress, no matter how carefully and smoothly it may be milled, becomes woolly and rough by contact with moisture, and this prevents its use in greenhouses where a permanent high finish is desired. In curvilinear houses the iron rafters should be bent to fit the roof lines, and this bending, except in the case of a very large radius being used, should be done while the iron is heated to a proper and even temperature; otherwise, its strength is greatly impaired. Of course great care must be exercised in the heating of iron for such bending, and ovens and other conveniences especially designed for this purpose are necessary to prevent an uneven heating or burning of the iron, which would be equally as destructive to its strength as would the cold bending.

Glazing. I will now pass to some important details in glass houses, and first the glazing. The first thing necessary is to get suitable glass. For roses, and other plants which require the most perfect light, I would certainly recommend the use of French or Belgian glass — that known generally as double thick, second quality, the first quality being too expensive and not possessing any material merit for plant culture other than that possessed by the second quality. For other greenhouse purposes, I believe glass of American manufacture is well suited, and have no doubt that the time will soon arrive when we shall be able to compete in quality, as in price, with glass of a foreign make. I think that the only reason our domestic factories do not produce

glass equal to that of foreign competitors is the higher cost of labor, but improved methods of manufacture will soon equalize these matters. The advantages of foreign over domestic glass are chiefly greater clearness, toughness, or strength, and absence of waves.

Methods of Glazing, etc. There is only one perfect method of glazing for greenhouse work, and that is with light wooden bars, and the glass bedded in suitable putty. The bars should be so rabbeted as to leave a V shape, the putty being rubbed into the V, and the glass then rubbed and pressed down firmly, until the lower side rests on the sharp edge of the wood, and solid zinc shoe nails or other suitable points are driven into the bar above the glass to prevent its displacement. The surplus putty both above and below the glass is then carefully cut away, and in painting, the paint should be laid on thickly over that putty which may be exposed on the upper side between the glass and the bar, and also on the glass which is directly over the bar. This effectually preserves the putty in the joints from the detrimental action of the atmosphere.

A system which, at first sight, and to the uninitiated, appears to have extraordinary merits, and yet which yearly causes a great waste of capital, and is the source of great annoyance to those who employ it, as well as regret to those who have innocently advised its use, is that known as the metallic glazing. There are many systems of such glazing on the market, both patented and otherwise, but, my friends, I cannot advise you too strongly against the use of any one of them, or any so-called improvement or modification of them.

In order that you may realize the defects in this system, I will ask your attention to the following points: First, because of the unyielding surfaces of both glass and metal (soft sheet lead excepted), it is impossible to get a perfect contact one with the other, and without perfect contact a perfect and air-tight joint and security of the glass is impossible. An air-tight joint may be made by the intervention of sheet rubber, sheet lead, cotton saturated with white or red lead, and many other substances, but it is only temporary, as the effects of moisture and variation of temperature will soon cause decay on the one hand, and the continual friction, caused by the difference of expansion of the metal surfaces and the glass will soon wear away the intervening packing. This continual friction also causes a wearing away of

the surfaces of the metal, and in the case of galvanized sheet iron destroys the galvanized surface, and exposes the iron to the rapid and destructive action of rust.

There are many metal glazing bars in the market, made of zinc and other so-called non-corrosive materials, for which it is claimed that there is sufficient spring to prevent this above-described friction, and while to a certain degree this may be true, in the direction of one bar from another, yet this friction and consequent destruction and displacement is equally as prominent as in some bars without this spring, and in many cases more so, in consequence of the expansion of the bar in the direction of its length.

Another serious difficulty connected with metal glazing is the great loss of heat in the building, caused by the rapid radiation of heat through the metal surfaces exposed to the inner and outer air. No part of the metal frame of a greenhouse, excepting a small portion of the gutter should be exposed to the outer air.

For the glazing of houses having curvilinear roofs, I would advise having the glass bent to fit the curves. This allows the use of lights of glass twenty-four inches long, and insures a much neater and tighter roof than can by produced by using many short lights around the curves, as was done in times gone by. Many think that the curved glass is very liable to breakage during hail-storms, but experience has taught us the reverse, and this is easily explained, as in the bending the glass becomes annealed or toughened.

Painting. We will now consider the painting of greenhouses. This feature should receive close attention, as upon its use or neglect rest in a great measure the durability and weather-proof qualities of the structure. All parts should be well primed before erection, the iron being scraped, or brushed with stiff steel brushes, to remove all scale, sand, or grease, and then coated with a good quality of anti-corrosive paint and pure linseed oil, using as little dryer or turpentine as possible. The wood, which of course we assume to be perfectly dry and clean, should be well saturated with white lead of good quality and pure linseed oil, either by dipping or by careful laying on with the brush.

After erecting and glazing, the whole house, both iron and wood, should receive two more coats of pure linseed oil and good white lead, thinned with a little turpentine, one coat being perfectly dry before the other is laid on. After the expiration of one full year, the entire outside of the roof and glazed portions of the house

should receive one additional coat. It will be found very advantageous, if a small percentage of oxide of zinc is mixed with the white lead used for painting the inside of the houses. This imparts a much brighter whiteness, and prevents the growth of the gray fungi which adhere to interior surfaces painted with the lead only, and which give the inside of the house a dirty and untidy appearance after a short season's use. This mixture is used now very largely in Government work, and also in the greenhouses at the Executive Mansion at Washington, it being there, I believe, that the original experiments were first made, and the good results discovered.

Ventilation. Ventilating conveniences play a very important part in the furnishing of a greenhouse, the usual system being to have a continuous line of sash about three feet deep along one or both sides of the ridge, and also a similar line below the gutter or eaves line, these being operated by some suitable mechanical means; preferably by the well-known worm and wheel apparatus.

Heating. The heating apparatus plays the most important part in the furnishing of a greenhouse. There are three systems of heating in use; namely, first, by means of hot-air flues; second, by means of circulation of steam through coils of pipes; third, by means of a circulation of hot water through coils of pipes. The heating by flues is a very primitive method, but is often resorted to in consequence of its small first cost, but its cost of maintenance is greatly in excess of that of either steam or water heat, and its results leave much to be desired, as the flues will become leaky, and allow dust and gas to escape into the greenhouse, and destroy all but the hardiest stock. Steam heat comes next in the order of merit; it also has the advantage of comparatively low first cost, but also has the disadvantage of being costly of maintenance, both in the matter of fuel, attention, and repairs. This system is largely in use, and finds many advocates. Hot-water heat, while entailing greater first cost, is the system in general favor, being economical in fuel, requiring very little attention, entailing no cost for repairs, and at all times, when there is any fire under the boiler, being positive in its action. Thus far, it must readily be admitted that the hot-water system of heating is the most desirable, but we have yet to consider the effects on plant life. Steam heat, on account of its intensity, has a tendency to dry the atmosphere of the house to the injury of the plants, but this can be easily counteracted, by means of frequent and

liberal syringing, and if the necessary moist condition of the atmosphere is maintained, the effect of hot water and steam heat upon the plants will be equal; therefore, we find the merits of these systems as follows:

In favor of the steam system: Low first cost, being from seventy-five to eighty per cent of that of a similar hot-water plant.

In favor of the hot-water system: Economy of fuel and ease of management; absence of the necessity for repairs; positive circulation, and consequent radiation of warmth under all conditions of the fires.

The *objections* to each of these systems are; *To the steam system:* Additional fuel consumption, necessity of skilled and continual attention; liability to accidents, leaks, etc., and consequent cost of repairs; total loss of radiation when fires become so low as to allow the temperature of the water to drop below 212°, and consequent loss and damage to stock.

The hot-water system has *one disadvantage* only, namely, higher first cost. I am thus compelled to give the preference to the hot-water system, and will proceed to mention some details which are desirable in its arrangement. Of course, it is understood that the heating of greenhouses must be by a direct system, as no indirect system would give a sufficiently even distribution of the warmth for this purpose.

Two systems of water heating are in use; the first being known as "upward circulation," by which we understand a continual upward grade of the pipes, to a point farthest from the boiler, and a downward grade from that point back to the boiler. The second is known as "drop circulation," where the rise to the highest point is taken directly over the boiler, the pipes then grading downward all the way back. I do not think either of these systems should be given a preference as regards their effect, under ordinary circumstances; but as the "upward" system presents so many less difficulties in the course of construction than the "downward," I would strongly advise its being used in all cases, unless some peculiar conditions of grades or other details of arrangement of the houses exist, which might render the "downward" system advisable.

Benches. In the furnishing of a greenhouse, we must not overlook the benches. If low-cost benches are desired, they may be made of cypress, but for the commercial grower who is interested in future profits and small repair bills, I would advise

an iron bench frame with wooden bottoms, these bottoms being easily replaced at a small cost, without disturbing the main supporting frame. If a permanent bottom is desired, porous tiles may be used, which make a practically indestructible bottom, and one which is very beneficial to the plants, as it admits of a free drainage and circulation of air to the roots. For benches or tables in conservatories for the reception of plants in pots, a slate bottom is desirable, the slate being three-quarters of an inch thick, and planed smooth on both sides. This gives ample strength to support large plants.

I think I have covered the general details in connection with greenhouse construction, as fully as the time will admit, but if there are any especial features which anyone present may wish advice upon, I shall be pleased to give it to the best of my ability.

Discussion.

Kenneth Finlayson spoke of the difficulty of keeping paint from mildewing in greenhouses, especially tropical houses where there is always so much moisture — a condition that seems to favor the rapid growth of the gray fungus. He asked if there were any known preventive or remedy.

Mr. Gibbons advised in preparing the paint to use about twenty to twenty-five per cent of oxide of zinc with seventy-five to eighty per cent of lead. When in Washington some time ago, he visited the conservatory at the White House, and also other structures of the National Government, and was struck by the intense whiteness of the interiors after five to seven years' use. Upon inquiry he was told of this composition, which is found to prevent the growth of the gray fungi referred to, and also the peeling of the paint from the wood.

In reply to another question, Mr. Gibbons said the Hitchings gutters are of thin cast iron; the side next to the greenhouse is exposed to the interior heat, which prevents any freezing on that side, even in zero weather; joints are lapped a little and lined with cement, and all the bolt and screw holes are drilled a little larger than the diameter of the bolts or screws used. By these means all trouble from ice expansion in the gutters is prevented.

As to lapping or butting glass, Mr. Gibbons thought that lapping is always best. In butting glass it is desirable, if not imperative, that the glass should be of uniform thickness, a condition rarely found in either a small or large purchase of glass.

To a question as to best size of glass, Mr. Gibbons answered that, as a rule, the glass should be sixteen by twenty-four inches.

In reply to a question as to the object of grooves in sash-bars, Mr. Gibbons held that the grooves would receive the greater portion of water that was thrown or condensed upon the glass, and convey it to a point over the space between the back of the side benches, and the plate, where the lower side of the groove is cut away, and the water falls directly to the ground. Accumulation of dust in these grooves rarely amounts to an obstruction.

It was asked whether it is better to use four-inch or two-inch pipe for heating a greenhouse, and Mr. Gibbons replied that he prefers four-inch to two-inch pipe, although, other things being equal, the effects of both on plant life are the same. But the four-inch pipe is more reliable, having a larger reserve of heat for an emergency, and will last much longer than any smaller, wrought iron pipe.

Another question was asked as to comparative advantages of the upward and the downward systems of hot-water circulation in greenhouses.

Mr. Gibbons replied that formerly greenhouses were built to accommodate the heating system; but, as in these days we have often to accommodate the heating system to the greenhouses, he thought that under ordinary circumstances the system best adapted to the location, grade, and arrangement of the greenhouse would perhaps serve the purpose better than the other. But where the range to be heated includes more than one house, the drop circulation is difficult to manage; therefore, as stated in the paper read today, taking all things into account, he would strongly advise the upward circulation system in all cases except where the local conditions are such as to render the downward system necessary.

A question being asked as to comparative advantages of tiles or slate for the bottoms or floors of plant benches or stages, Mr. Gibbons said that tiles are in great favor for bench bottoms; they are much superior to slate when the bench is filled with soil in which plants are set, but, for plants in pots slate bottoms are preferable. The advantage of tiles lies in the fact that when they are made, a quantity of coarse sawdust is mixed with the sand and clay, and when they are fired the sawdust is burned out, leaving the tile very porous, thus securing perfect drainage and ventilation.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, February 16, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair. The following paper was read by the author:

ECONOMIC ENTOMOLOGY IN RELATION TO TREES, SHRUBS, AND PLANTS, IN PARKS AND PRIVATE GROUNDS.

By EDMUND B. SOUTHWICK, Ph. D., Entomologist of the Central and City Parks of New York, N. Y.

I am here today to give some hints as to the needs in the care of trees, shrubs, and plants in parks and private grounds, and also to suggest such remedies as I have found of especial benefit in the care of vegetation in the Parks of the City of New York.

An experience of over twelve years has given me an opportunity to become acquainted with these needs, and also enables me to give some advice as to the proper care from an entomological standpoint.

Today I am addressing an intelligent body of horticulturists, who know a tree when they see it and also its family history and the fruits thereof; and you will agree with me, that ignorance of the subject is the greatest drawback to a proper appreciation of it, and therefore to a proper carrying out of the work in "Economic Entomology."

Happily, however, the times are ripening for a wider appreciation and better work—not so much, I fear, from the extra education as from the necessity of combatting insect foes which are becoming so destructive on every side—and men who own fine trees and shrubs are forced to admit that there is an importance attached to Economic Entomology, and that they must consult an entomologist just as they must consult a physician or a lawyer in necessary cases.

The people, however, are not educated up to the point of consulting the physician in this case, and even when the destruction is inevitable and they seek advice, they often will not take the trouble to prosecute the work.

Dr. Thaddeus William Harris, your renowned fellow townsman, was one of the first in the field to begin this education, and as far

back as 1831 he published a list of the insects of your State. The importance of his researches was so appreciated that he was appointed one of a commission for a more thorough survey of the geology and botany of your State, entomology, however, being still an outside issue, and only developed because of his knowledge of its great importance to future generations in the care of vegetable productions so essential to the life of man. Entomologists who see the possibility of increase so enormously displayed in insect life, are specially educated as to what will become of vegetation, if steps are not taken successfully to combat the hosts increasing both in variety and numbers.

As pleasant as it is for me to congratulate you upon the successful work already accomplished in your State, it is my more important duty to remind you that our knowledge of the work of keeping insects in subjection, is still but in its infancy, and we must not only be willing to work in lines that now look to us fairly successful, but must deliberately look for deficiencies, and study to devise more effective means to meet all these needs. Of the hundreds of letters I have to answer during the year, I have yet to receive one in reply, saying the advice was thankfully received and the work would be undertaken.

In one of our prominent Hudson River cities, the elm trees were being defoliated by the elm beetle last season, and one of the prominent citizens came to me in seemingly great distress and wanted to know what we were doing to keep our trees looking so well. After advising him and showing him our machines at work, he said he would at once have the work started and carried on. That was the last I heard of him until this winter, when another citizen of the same place called to see me — filled with still greater distress, if that were possible — and wanted to know what to do with the trees in order to preserve the foliage for the coming summer. He thought they were dying, and something must be done. I mentioned the fact that his fellow townsman had, I supposed, been destroying the insects during the past summer. "Yes," he replied, "That gentleman told us he had seen you, but did not think the work practicable." The truth was, it was too much trouble, after consulting the physician, to apply the remedy, and as soon as he found that it was not altogether slight-of-hand work, but real drudgery, he put it out of his mind and soon set aside the heavy responsibility. And this is but one

example of the use that is made of advice freely and gratuitously given. Nine times out of ten nothing ever comes of it.

I must speak of another foe which deeply concerns trees, and that is *Fungi*. They not only destroy the foliage but break up the tree trunks themselves. Another practice I must also condemn is the wholesale cutting back of trees and shrubs by "tree butchers," who are so numerous in these days. As we ride about in the cars through our cities and towns, we see on every hand where these tree-vandals, have been at work, destroying thousands of fine trees, — actually beheading them. Again, we see the same men, cutting off great numbers of large limbs for no apparent reason, and leaving their large stumps or scars exposed to the action of the elements, insects, and fungi.

No study is ever given to the character of a tree, and elm, maple, and willow alike receive the same treatment. Our trees are too valuable to be destroyed in this way, and the time is at hand — at least with us in New York — when imported insects will do too much of this kind of vandal work, and we are already only too desirous to preserve a bud which will at some time develop into a branch to fill a vacancy that injures the symmetry of the tree and is an unsightly deformity in the eyes of the owner.

In the large city parks of New York, comprising over four thousand acres, there is a great diversity of foliage and tree growth, and therefore a great variety of parasitic life, both animal and vegetable. Like your own city of Boston, New York is a great importing centre, and new things are there being constantly introduced into our country. We are now suffering from some of these introductions, among which the Elm Leaf Beetle (*Galeruca xanthomelæna*) and the Wood Leopard Moth (*Zeuzera pyrina*) can be mentioned.

From a horticulturist's point of view, most of you know how to combat enemies of fruit trees, but perhaps not all who may read this are as wise in their generation, or even willing, like yourselves, to give the time and attention to these details that are so essential to success. I will, therefore, attempt to describe some of the most conspicuous enemies of our shade and ornamental trees, and also the most effective means of combatting them successfully. One of the most serious pests of the many that have been introduced into this country is the Wood Leopard

Moth, not forgetting your own troubles with the Gipsy Moth which you are so heroically fighting, under so able a general as Professor C. H. Fernald, and the great lesson you are learning of the necessity of the same concerted action in this as would be demanded in case of a terrible epidemic scourge.

The Wood Leopard Moth was probably introduced here about twelve or fifteen years ago, and since then it has grown in strength of numbers though not in public favor. The glamour of rare specimens of the moth in entomological collections, has passed its incipient stage, and we are actually in the midst of a fearful warfare. The enemy has already worsted us in many sections around the city, and I am sorry I cannot say that we are able to impede its progress, or that we have hope that it may be stamped out. I cannot say how soon you also will have to take up arms against this destructive foe, for I must confess to you that it is marching on, despite the efforts we in New York City are putting forth, and must eventually reach your vegetation also. It has already spread into parts of New Jersey and Long Island, and is steadily marching northward. This moth has already appropriated as congenial food, over one hundred species of trees and shrubs, and so far the evergreens or conifers seem to be the only ones exempt. The larva of this moth is able to amputate tree-trunks that are six or seven inches in diameter, by cutting a burrow around the trunk, which so weakens it that a strong wind is sure to break it off. Our elms and maples seem to be their favorite food, and thus far have suffered most. Our treatment for the destruction of this insect is to collect all affected limbs and destroy the larvæ we find in them. All limbs that are broken are taken down and destroyed by fire after we have removed and killed all the larvæ we can find. All the smaller trees of the parks are examined carefully, and when a burrow is found bisulphuret of carbon is injected into it and the burrow closed with putty or soap. We often find as many as a dozen or more borers, in the trunk and branches of a small elm or maple from four to six inches in diameter, and these are easily treated with the bisulphuret of carbon, which is sure death to any living thing in the burrow. I have also found it a most effectual remedy for the Apple Tree Borer, and all borers of fruit trees where the burrows can be found; they are often very prominently marked by the frass these borers eject from their burrows. Take a common oil

can with a spring bottom and the liquid can be forced from it, into the burrows without difficulty. I have used bisulphuret of carbon in various forms for insect destruction since 1885. It is most valuable in washes for scale insects also. Injecting bisulphuret of carbon into the burrows of insects is, I consider, one of the most important discoveries I have made for the destruction of wood-boring larvæ. In 1893 we spent three months collecting and destroying the larvæ of this insect, and last year showed the valuable effect of this thorough work in the decreased number working upon our trees.

The next most troublesome species of insects to us is the Tussock Moth (*Orgyia leucostigma*). I see that you have the same species abundant in your own city. For their destruction I have resorted to four methods. First, by hand-picking and by removing the cocoons with wire brushes. In this way barrels of the egg-masses are collected and then destroyed. Second, by jarring the larvæ down with a pole so arranged that a blow from a mallet on a projection at the larger end of the pole, will jar down any that may be on that limb, for they are easily dislodged by the concussion. Third, by poisoning the foliage with London purple, which is quite effective, especially on trees that have not been properly cleared from egg-masses during the winter. Fourth, by spraying the trunks of large trees that are covered with cocoons, with an emulsion of petroleum and crude carbolic acid. This emulsion, put on with a stiff spray, will penetrate most of the cocoons and destroy the pupæ or larvæ within, and many of the eggs that have been deposited on the outside of the cocoons. This last method is only resorted to, when from want of proper winter cleaning, the trees have been defoliated by these insects.

For the Elm Beetle (*Galeruca xanthomalæna*) we try to follow up preventive measures by spraying the trees with London purple, as soon as we find the first groups of eggs. This is usually from May 28 to June 6. This spraying is kept up at intervals of two or three weeks, until autumn. Another method which we are faithfully following is to kill all the pupæ we can find at the base of the tree or along walls and in any out of the way places. This, I think, is of the greatest importance, and all pupæ should be destroyed as fast as they show themselves. An emulsion of petroleum and carbolic acid is used, and this is sprayed into and over all places where the larvæ have crawled to pupate.

The Bag Worm (*Thyridopteryx ephemeræformis*) was at one time very destructive to our park trees, and is still, I am told, in some sections of the country. These can be readily removed with tools in the winter season, and the trees can also be sprayed for their destruction when in foliage. For Tent Caterpillars and others that feed in masses, as Vanessa, Datana, etc., the most effectual method is to remove the mass as soon as they are discovered. If they are very young, a single twig or even a leaf, will be all that it is necessary to take off; but if left till nearly full grown, they can be taken out by hand, or if on an unimportant branch, this may be cut away with the attached mass.

For scale insects, many of the emulsions so well known can be applied, and if a pliable steel brush is used in addition, the work can be made very complete, save on the smaller twigs, which can be sprayed with the emulsion as the best means of reaching the insects without destroying the smaller branches.

For Plant Lice (Aphides) one of the most effectual means is to break up the colonies with a stiff spray of water, for most of them have a gummy secretion that prevents the emulsion from acting upon them, but let the hose be played upon them for a moment, and they are in condition to receive the destructive agent.

For the Pine Chermes (*Chermes pinicorticis*) and the Maple Pulvinaria (*Pulvinaria innumerabilis*), I have for a long time been using the spray, and it is the most effectual means of cleaning a tree of these pests. With this spray one can knock down quantities of larvæ from the branches, and most effectual work could be done with a steam engine with the proper hose attachments in killing great quantities of insects besides keeping many of them in subjection. I would condemn the practice of boring holes into trees, with the idea that the preparation inserted is going to spread over the whole tree and thereby destroy all kinds of insects; that is a physical impossibility. We who have charge of plantations of trees are constantly beset by venders of remedies of all kinds that will kill everything but the trees. My advice is, do not waste time and money trying everything that is offered, but consult a physician who is making this a life work — and you have a number of the very best of these in your own state — and his conservative opinion, born of hard practical experience, will be the best advice to follow.

In treating our trees, shrubs, and plants for the destruction of insect foes, I would advise careful and persistent winter work, for when the trees are leafless is the best time to remove all cocoons, egg-masses, etc., from the limbs and trunks, and every dead leaf or bunch of leaves that is fastened to the limbs ought to be considered as harboring a mass of eggs or a pupa, and even if it does not it is safer to have it out of the way. Always make your winter work thorough and your summer trouble will be less. These preventive measures are always to be studied and practised. As you watch the expanding foliage, flowers, and fruits of your trees, watch also for their enemies. Learn to distinguish between friend and foe so as to be able to preserve the one and destroy the other.

Discussion.

Professor Southwick displayed numerous charts, two by three feet in size, some having magnified figures of the noxious insects and fungi referred to in his paper, showing them at their different stages of development, that those present might be able to recognize the living specimens at sight.

Other charts showed various tools and the method of using them in the warfare against the many insect pests infesting the trees, shrubs, and plants in the several parks in the city of New York.

There was also quite an array of the smaller tools, among which were brushes of various forms and sizes, the brush material being steel wire of different degrees of firmness and elasticity. Some were suitable for brushing cocoons and egg-masses from the trunks and branches of rough-barked trees, while others were used on those with smooth, tender bark.

There were knives of different sizes and forms, of which the shoe knife was held to be the most useful; also gouges, chisels, mallets, saws of different styles, metal cans with spring bottoms, used to inject bisulphide of carbon into the burrows of wood-boring insects in trees and shrubs, and a variety of other implements for special purposes.

As Professor Southwick found nothing in the markets to serve his requirements, he invented apparatus to meet his need in particular lines of work.

This collection of charts excited considerable interest, and at the conclusion of the lecture, many of the audience came to the

platform to examine them more carefully. This led to conversation rather than discussion, but from which the following information was gleaned:

Twelve years ago when Professor Southwick assumed charge of the entomological work in the parks of New York City, large numbers of trees were defoliated by the Bag Worm (*Thyridopteryx ephemeræformis*). The trees looked as if a fire had swept through them, so completely were their leaves eaten by this insect. With his improved tools, made for this work, he collected nearly twenty-two bushels of these insects in one season and destroyed them. This method of dealing with them nearly extirpated the species and it has since been easy to keep them in subjection. This was done when the trees were leafless, and the insects' cases were easily seen. The Elm Leaf Beetle (*Galeruca xanthomelæna*) works on the leaves of the elm tree, the beetles eating round holes in the leaves and the larvæ consuming every vestige of the parenchyma. Professor Southwick said that in May and June he constantly watched the elm trees in the parks, and as soon as he saw the beetles or larvæ at work he immediately sprayed the parts affected, but did not attempt to spray the whole tree at that time. From the middle of May to October the trees were sprayed several times. The solution used was: London purple, one pound; flour, four or five quarts; lime, three pounds; and water, one hundred gallons. The flour is added to make the poison adhere to the foliage. The solution is sprayed on the under side of the leaves as much as possible, from a fine cyclone nozzle. This solution is carried from the force pump to the nozzle, through a quarter-inch orifice, rubber canvas insertion hose. The canvas makes the hose strong and light, so that when it is lashed to a light bamboo pole, the operator can hold up fifty or more feet of it without difficulty. Professor Southwick urged that the larvæ of the Elm Beetle should be destroyed when they come down the trunks of the trees to pupate at its base, as this would materially lessen the number of beetles for the next generation. In the case of large trees, the men climb into them, but if they are not over fifty feet in height, an extension pole is used to raise or lower the spray as is needed. These poles are fastened to each other with bands and are hoisted up and let down with a rope and pulley. The preparation used for destroying the larvæ and pupæ at the base of the tree is: Soap, six pounds; kerosene,

five quarts; carbolic acid, two or three quarts; and water, one gallon. This is boiled together and afterward mixed with one hundred gallons of water.

The Wood Leopard Moth (*Zeuzera pyrina*) was first noticed by him in the New York Parks in 1884, when the gardeners brought him a larva which they had taken from an elm limb. The female of this insect probably inserts an egg at the base of a leaf or node of the twig, and the young larvæ enter the twigs at that point. As it increases in size, it bores to the lower part of the branch, or leaves it and migrates to another branch or to the trunk. From a small maple three and one-half inches in diameter, Professor Southwick said he had taken thirty-two borers of this destructive insect, and that in the city parks they had already been found in over one hundred species of trees and shrubs. The remedy is to destroy all branches that are affected or broken off, as far as possible, and to inject bisulphide of carbon into their burrows, and putty up the hole. Their burrows can be easily found, as the borer throws out the frass and this can be seen at the base of the tree or on the trunk and limbs. Professor Southwick said, the great secret of success with spraying compounds and insect subjection is in preventive measures; that is, treating the affected plants before the insects have spread over the entire foliage, and following it up by repeated applications as the cases in hand required.

The Rose-chafer or Rose-bug (*Macrodactylus subspinosus*) is described by Dr. T. W. Harris, in his work on "Insects Injurious to Vegetation," as "one of the greatest scourges with which our gardens and nurseries have been afflicted." As it breeds below the surface of the earth, we have to deal with it only in its beetle form, and during a period of about forty days from the second week in June, each year. The most reliable methods of treating them are, first, by hand-picking into a dish containing kerosene, and, second, by jarring the tree, shrub, or vine upon which they are feeding; this frightens them and they instantly let go their hold on the plant and drop to the ground; but we can catch the falling insects upon cotton sheets (previously arranged under the plant like an inverted umbrella) and then kill them in kerosene. This should be done in the earlier hours of the morning when the beetles are less active, as during the warmer part of the day they will be quicker on the wing and escape.

Professor Southwick, in reply to a question, stated that they had no Gipsy Moths (*Ocneria dispar*) in New York City or vicinity.

A species of Sap-fly, supposed to be a Sciaria, has proved quite mischievous among the park trees of New York City. If a limb is cut off, it often happens that the scar is induced to bleed by the white worm-like larvæ of this dipterous insect, which are able to keep up the flow until cold weather. This sap, which becomes sour and of the consistency of thin jelly, runs down the trunks, rendering them very unsightly, and no doubt the trees are weakened by its continuous loss. These spots are conspicuous on several species of trees but the elm is the more often affected, and the wood, thus softened and exposed to the action of the atmosphere and to the spores of fungi, soon becomes a rotten spot in the tree unless the progress of decay is arrested. The remedy has been to spray the spots with a carbolic acid solution; then, when nearly dry, to brush the scar clean with a rice-root brush, dry off with plaster of Paris and apply paint or shellac (or liquid celluloid if the tree is a valuable one), after which there will be no more trouble. Incidentally, reference was made to fungous disorders or pests, and Professor Southwick remarked that there were a great many species working on the trees and shrubs, and that *Agaricus ulmarius* was conspicuously destructive; that a well-developed bunch of it was found upon a scar from which a limb has been removed only two weeks before. He added that the mycelium of the fungus penetrated the wood a long distance and soon destroyed its structure.

Being questioned as to the possibly fatal effect upon poultry from eating apples that have been sprayed with the London purple solution, Professor Southwick said that as the solution contained as much lime and as much flour as of the London purple, and should be put on in a spray as fine as mist, he doubted whether any harm would come to any poultry from the quantity of the fruit they would eat.

MEETING FOR LECTURE AND DISCUSSION.

Saturday, February 23, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The following paper was read by the author:

Experimental Evolution Amongst Plants.

By Professor L. H. Bailey, Cornell University, Ithaca, N. Y.

[Before entering upon the proper subject of the hour, the speaker made some introductory remarks concerning the present state of belief in the theory of evolution. A brief abstract of these remarks is here given.]

Every thoughtful person at the present day is an evolutionist, although he may not know it. Everyone now considers every movement, either of human society or of natural forces, in connection with its origin and gradual growth or development. A person may be an evolutionist without subscribing to any particular doctrine of the origin of species or to any particular dogma either of religion or science. Evolution in the abstract means merely a gradual unfolding or growth. In the organic world, the term is used to designate the belief in the origin of one form or one species from another. Its use does not necessarily imply that one believes in the origin of all things from one species or from many. It simply means that a person sees growth, development, and progression in nature.

There are two chief reasons for the belief in the evolution of animals and plants: first, the fact of struggle for existence; second, the fact that there are constantly recurring physical changes. The struggle for existence is the necessary result of the multiplication of species, and the physical changes necessitate a constant modification of the species in order that they may fit themselves into the environment.

There are five chief lines of proof of evolution: first, the record of the rocks, or palæontology; second, the fact that animals and plants are widely variable,—so much so that no two individuals in the world are exactly alike; third, we can see adaptive changes taking place, particularly among plants which are widely disseminated by man or which are brought under domestication; fourth,

the presence of missing links or breaks in the chain of life, which shows that those forms which are weakest, or least adapted to live, have dropped out and have left the others to strengthen themselves; and, fifth, the fact that there is a perfect adaptation of all organisms to their environments or conditions of life.

The doctrine of evolution is old, although it was not until the opening of the present century that it began to take on specific and technical form. It was taught more or less vaguely by the Greeks, and, later, by the Arabs. Perhaps it may be said that two chief epochs in the history of the unfolding of the doctrine are those represented by Copernicus and Darwin. Copernicus disproved the old geocentric doctrine, or the notion that the earth is the center of the universe; Darwin disproved the homocentric doctrine, or the notion that man is the central object of nature. We now conceive of the universe as a whole, undergoing a general progressive or onward movement in which all its parts are intimately concerned.

After these introductory remarks, Professor Bailey delivered his lecture as follows:

De Varigny has written a most suggestive book upon Experimental Evolution, in which he contends for the establishment of an institution where experiments can be definitely undertaken for the purpose of transforming a species into a new species. "In experimental transformism," he writes, "lies the only test which we can apply to the evolutionary theory. We must use all the methods we are acquainted with, and also those, yet unknown, which cannot fail to disclose themselves when we begin a thorough investigation of the matter, and do our utmost to bring about the transmutation of any species. We do not specially desire to transform any one species into another known at present; we wish to transform it into a new species. * * * Experimental transformism is what we need now, and therein lies the only method we can use."

This is a most commendable object, and I hope that the attempt will be made to create a new species before our very eyes. This is what most people demand, as a proof of evolution, and they are sometimes impatient that it has not been done; and it would seem, upon the face of it, that nothing more could be desired. When I reflect, however, upon the fact that this very thing has occurred time and again with the horticulturist, and then

consider that botanists and philosophers persist in refusing to see it, I am constrained to offer some suggestions upon De Varigny's excellent ambition. If I show a botanist a horticultural type of recent or even contemporaneous origin which I consider to be specifically distinct from its ancestors, he at once exclaims that it is not a species but a horticultural variety. If I ask him why, he replies, "Because it is an artificial production!" If I show him that the type is just as distinct from the species from which it sprung as that species is from its related species and that it reproduces its kind with just as much certainity, he still replies that, because it is a horticultural production, it cannot be a species. In what, then, does an accidental horticultural origin differ from any other origin? Simply in the fact that one takes place under the eye of man and the other occurs somewhere else! It is impossible at the present day to make a definition of a species which shall exclude many horticultural types, unless an arbitrary exception is made of them. The old definitions assumed that species are special creative acts, and the method of origin is therefore stated or implied in all of them. The definition itself, therefore, was essentially a statement of the impossibility of evolution. We have now revised our definitions so as to exclude the matter of origin, and thereby to allow free course to evolution studies; and yet here is a great class of natural objects which are practically eliminated from our consideration because, unhappily, we know whence they came! Or, to state the case differently, these types cannot be accepted as proofs of the transformation of species because we know certainly that they are the result of transformation!

Now, just this state of things would be sure to occur if De Varigny were to transform one species into another. People would say that the new form is not really a species, because it is the result of cultivation, domestication, and definite breeding by man. He could never hope to secure more remarkable transformations than have occurred a thousand times in the garden; and his scheme — so far as it applies to plants — is essentially that followed by all good gardeners. Or, if the prejudices of scientists respecting the so-called artificial production of species could be overcome, he could just as well draw his proofs of evolution from what has already been done with cultivated plants and domesticated animals as from similar results which might arise in the future from his independent efforts. I am not arguing

against the scheme to create a species before our eyes, but I am simply stating what has been and is the insurmountable difficulty in just this line of endeavor,— the inability of the experimenter to satisfy the scientific world that he has really produced a species; for it is a singular thing that whilst all biologists now agree in defining a species upon its tangible and present characters, they nevertheless act, for the most part, upon the old notion that a species must have its origin somewhere beyond the domain of exact history.

This notion that a species, to be a species, must have originated in nature's garden and not in man's, has been left over to us from the last generation,— it is the inheritance of an acquired character. John Ray, towards the close of the seventeenth century, appears to have been the first to use the word species in its technical natural-history sense, and the matter of origin was an important factor in his conception of what a species is. Linnæus's phrase is familiar: "We reckon as many species as there were forms created in the beginning." Darwin elaborated the new conception,— that a species is simply a congregation of individuals which are more like each other than they are like any other congregation, and with a freedom from prejudice which is rarely attained even by his most devoted adherents, he declared that "one new variety raised by man will be a more important and interesting subject for study, than one more species added to the infinitude of already recorded species." The old naturalists threw the origin of the species back beyond known causes; Darwin endeavored to discover the "Origin of Species," and it is significant that he set out without giving any definition of what a species is. I have said this much for the purpose of showing that it is important, when we demand that a new species be created as a proof of evolution, that we are ourselves open to conviction that the thing can be done.

I have said that no modern naturalist would define a species in such terms that some horticultural types could be excluded, even if he desired that they should be omitted. Haeckel's excellent definition admits many of them. In his view, the word species "serves as the common designation of all individual animals or plants, which are equal in all essential matters of form, and are only distinguished by quite subordinate characters." It is impossible, however, actually to determine whether one has a species in

hand by applying a definition. One must show that his new type — if it is a plant — has botanical characters as well marked as similar accepted species have, and these characters must show, as a whole, a general tendency towards permanency when the plant is normally propagated by seeds. He must measure his type by the rule of accepted botanical practice. If the same plant were found wild, so that all prejudice might be removed, would the botanist unhesitatingly describe it as a new species? If yes, then we should say that a new species had been created under the hand of man; and this rule I wish now to apply to a very few familiar plants. In doing so, I do not wish to be understood as saying that I consider it advisable to describe these plants as species under the existing methods of botanical description and nomenclature, for, merely as a matter of convenience and perspicuity, I do not; but I wish to show that they really are, in every essential character, just as much species as very many other universally accepted species are.

The evolution of forms which any botanist would at once designate as species, were he ignorant of their origin, is well illustrated in the tomato. Dunal, the accepted authority upon the genus Lycopersicum, admits ten unqualified species into his account in De Candolle's Prodromus. Two of these, *L. pyriforme* and *L. cerasiforme*, are generally regarded as mere forms of the common garden species, *L. esculentum*, both because they are very like the common tomato in botanical characters and because we know, as a matter of history and experiment, that all three of these reputed species are modifications of one type. Omitting these two species, then, there remain eight to which we cannot attach any such suspicion as a knowledge of their origin. These are what botanists call good species. These species agree in having a weak and spreading habit of growth, much like the common tomato. The features by which they differ amongst themselves, that is, the specific characters, are founded chiefly upon the manner of division of the leaves, the shape of the leaflets, the character of the flower cluster, and the relative hairiness or smoothness of the parts. If one applies these same tests in the same degree, to the two modern offshoots of the tomato — the Upright and the Mikado types — he will find that these offshoots differ as much or even more from each other and from their own common parent, than any one of the wild species differs from any

other species; and everyone knows that these characters come true from seed. The Upright type differs from all other tomatoes in its stiff and self-sustaining habit of growth, a character which belongs to Solanum rather than to Lycopersicum; and this habit is so marked that persons unfamiliar with the variety usually think the plants potatoes rather than tomatoes, when the fruit is not seen. The entire foliage of the plant is so distinct that the most casual botanist could draw botanical characters from it to separate the plant specifically from any other species of Lycopersicum which is yet described. The leaflets are reduced in number and are greatly modified in shape. Even the inflorescence shares in the transformation, for the flowers, instead of being six or more as they are in its known ancestors, are reduced to two or three. If De Varigny were to experiment for centuries, he could scarcely expect to produce any "new species" which should have better characters than this singular race of tomatoes, the origin of which is so well known that we have the record of the year in which it originated, and the very man who sowed the seed from which it sprung. This curious race came in suddenly, without any premonition, so far as we know, of its appearing, and the same thing has probably not originated a second time.

The other type to which I referred, the large-leaved or Mikado race, gave evidence of its coming. This type has a most remarkable divergence from the species in the most fundamental botanical characters of its leaves. The leaflets are much fewer than in the common tomatoes, very large, the lower side strongly decurrent on the stem, the margins entire, and the blades plane or flat,—characters which are as far removed from *Lycopersicum esculentum*, from which it came, as the characters of the latter are from other recognized species. In young plants, the leaves are even entire, a character which is supposed to be foreign to the genus. The tendency towards this large-leaved type was noticed many years ago in the old Keyes's Prolific tomato, but it appeared to have first attracted much attention in Nisbit's Victoria, a variety which came from seed of Hathaway's Excelsior, which has foliage very small, curled, and much divided. In very recent years, it has appeared again in a most emphatic form in the Mikado or Turner Hybrid, and in the Potato Leaf. We have a good indication of how distinct these two races of tomatoes are from the fact that we have a real species — that is, one which has no genealogy — in

cultivation, besides *Lycopersicum esculentum*, and it is not regarded by horticulturists as worthy such explicit description or separation from the common type of tomatoes as either the Upright or the Mikado type is. In fact, gardeners do not look upon it as a distinct species at all, although it is universally received by botanists, and Vilmorin even places it in the genus Solanum. This is the Currant tomato, or *L. pimpinellifolium*.

But the most remarkable feature of the evolution of the tomato, to my mind, is one which appears to have escaped scientific comment. It is the fact that, in America at least, the whole body of garden forms is rapidly progressing or departing from the original type. This original type, or something very like it, was the only tomato at the opening of the century, and it was essentially that which the older men of the present generation knew in their boyhood. The plant was comparatively small, with an erect or upright tendency of the young shoots, with foliage light in color and small and either thin or much curled, the leaflets tending somewhat to rounded forms, the flowers two-ranked in long and sometimes forking clusters, the fruit, in the simplest forms, strictly two-celled, and in the most developed forms flat on the top and bottom and corrugated or ridged on the sides. Now all this is changed, and there is only an occasional variety, or the persistent Cherry Tomato, which recalls the old type. At present, the tomato plant is large and widely spreading, with scarcely an indication of the spire-like growths of the young shoots which characterized the old forms, with foliage very dark green and large and the leaflets thick and flat and tending to pointed and jagged forms, the flowers reduced to irregular clusters of two to four, the fruit very many-celled, and, under the influence of recent selection, regularly rounded on top and apple-shaped. For nearly a century, the tomato has been steadily moving forward into this new form, with all its botanical characters profoundly modified; and it holds this form as uniformly when propagated from seeds as any wild species could be expected to do. If, as Haeckel declares, a species is a succession of organisms which exhibit the same form under the same environments, then even the common type of tomatoes might contend for specific distinction from their ancestors of a century ago. At all events, we have here as profound, onward, definite, transformation as De Varigny could hope to secure in the same length of time; and if

such productions as these of which I have spoken are not to be accepted as species, why should we accept those which we assume would arise under the care of an evolution experiment station? Here we have absolutely new and unique types, as De Varigny demands, and they are as distinct from each other and from their parents, in accepted botanical characters, as "good species" in the same genus are from each other, and they perpetuate these characters as unequivocally as those species do. Moreover, we know definitely what their origins were, and they therefore answer all the purposes of experimental evolution.

Similar observations respecting the evolution of forms of specific importance, could be made for most species of plants which have been widely cultivated for a considerable length of time. The case is singularly well illustrated in Indian corn. Maize has been very uniformly accepted as a single species by botanists. This arises mostly from the fact that corn is nowhere known truly wild, and has therefore attracted little attention from systematic botanists. There are some authors, however, who have made species of some of the marked cultivated types, either upon the hypothesis that these forms must have been derived from distinct wild types, or that, independently of origin, they merit specific recognition. The chief author who takes the latter view is Sturtevant, who, whilst accepting the common origin of all types of maize, nevertheless prefers to recognize seven "agricultural species," as follows: *Zea tunicata*, "a primitive form" from which the other six are derived,— *Zea everta*, pop corns; *Z. indurata*, flint corns; *Z. indentata*, dent corns; *Z. amylacea*, soft corns; *Z. saccharata*, sweet corns; and *Z. amyleasaccharata*, the starchy-sweet corns. Whilst these species are not accepted by the regular botanists, there can be no doubt that some of them would be regarded as distinct species if they should turn up in an evidently wild state; and a proof of this statement is found in Watson's *Zea canina*, which was founded upon wild corn collected in southern Mexico. Now Mr. Watson was one of our most conservative American botanists, and any new species which he should describe could be depended upon to have good botanical characters; yet this new *Zea canina* is so like our rice pop corns that Sturtevant unhesitatingly refers it to his *Zea everta*, thus showing that it is not more unlike ordinary corn than some types of pop corn are! Moreover, this corn is found to lose quickly

the very botanical characters upon which the species is founded, when it is brought into cultivation. Even in its wild state it is scarcely more distinct from the common races of maize than the "husk corn" is, or the curious striped-leaved corn of Japan,— and the latter would certainly be considered worthy of specific recognition by botanists were it not for the fact that historical evidence shows that maize was introduced into Japan directly or indirectly from the New World, and that, therefore, its origin is more or less enshrouded in knowledge! All this is but another illustration of how tenaciously botanists still hold to the Linnæan idea of species, whilst they profess the Darwinian idea.

A similar evolution of types which are as distinct and permanent as accepted species in the same genus, is well illustrated in the various beans. The common garden or kidney bean was made into two species by Linnæus, the pole beans (*Phaseolus vulgaris*) and the bush beans (*P. nanus*). Since it has been demonstrated by experience and experiment, that these groups are interchangeable forms of one type, botanists have discarded Linnæus's designations of them and now call the garden bean a single species; yet it should be said that a more explicit and satisfactory instance of the evolution of specific forms right under our own observation could not be demanded. The two groups are species until we discover that they have sprung from one type within historic times, whereupon we then regard them not as species but as anomalies of cultivation. Von Martens, however, discards origin as a mark of specific likeness or difference, and now proposes to erect seven species upon the obvious racial differences in the garden beans. But the most interesting feature of this bean botany is the complete neglect, on the part of botanists, of the singular dwarf Limas, which have appeared in very recent years. Remember, now, that Linnæus regarded the common pole beans and the common bush beans as two distinct species, because one is a running or twining plant and the other is a dwarf erect plant. The Lima bean is a twining plant; but within the last few years three well-marked types of true bush beans have sprung independently from the old types of Lima. If these differences were worth specific recognition in the common garden beans, why are not the same differences worth at least a passing comment in the Lima bean? Yet, because these types have originated before our eyes, botanists consider them not worth

notice, although, at the same moment, they are hoping for the time when they shall see the origination of a new species of plant! But this curious bean evolution has not stopped here. The old Scarlet Runner and White Dutch Runner of our gardens (*Phaseolus multiflorus*) have well marked botanical characters in the leaves, inflorescence, pods, beans, and particularly in the roots, which are fleshy and perennial, and in the very tall twining habit. Yet, at the moment when dwarf forms had sprung off the Lima stock — in the same way as the common bush beans undoubtedly had sprung off the stock of the common pole bean before Linnæus's time — a bush bean sprung off the stock of the old White Dutch Runner, and this is known in commerce as Barteldes's Bush Lima. But this singular bean has other characters than the very dwarf complete bush habit, to distinguish it from its parent, for it differs in a smaller inflorescence, in foliage, and particularly in a remarkable tendency towards a fibrous annual root. Here is a new form which surely ought to satisfy any person who demands the direct origination of a new species, as a proof of evolution.

There are other curiosities amongst the beans. Gardeners know two well-marked types or races of the Lima bean, the Sieva type and the Large Lima type. There are good and valid botanical distinctions between the two, which were amply recognized by Linnæus, who, supposing that one came from Bengal and the other from Africa, made species of them. The smaller, or what we now know as the Sieva type, he called *Phaseolus lunatus;* the other he called *P. inamœnus*. The term Lima bean, which all agree in associating with *Phaseolus lunatus*, should properly be applied, therefore, to the Sieva type. For a century these species of Linnæus were generally considered to be good,— that is, distinct and valid. It is now pretty well established that both these beans came from Brazil. Only one of them is known in a truly wild state, and the suspicion is so strong, therefore, that the other sprung off from it under cultivation, that the two types are now united as one species. Still a third well-marked type, differing in shape and texture of leaflets, and characters of pods and seeds, has now originated from the Large Lima type; this is the Potato Lima type. It should also be said that Macfadyen, in his flora of Jamaica, made four new species out of the Lima type of beans. Here, then, are three groups of beans, each

as distinct from the others and from its ancestors as accepted species of Phaseolus are from each other, yet, because of their origin under domestication, they are debarred specific distinction. Now, a most curious thing about these dwarf Lima beans, which have appeared so suddenly in the past few years, is that they have come from each of these three types,— Henderson's from the Sieva type, Thorburn's or Dreer's from the Potato Lima type, and Burpee's from the Large Lima type,— thus showing that each of these types or races is developing along independent but parallel lines; and these lines are also identical with the method of evolution which was early assumed by the common garden bean and with the departure which has just now appeared in the old White Dutch Runner.

The Soy bean, now coming into popular cultivation in the South, affords a most striking example of the evolution of a new species, and one, moreover, which is accepted by careful botanists. This plant is unknown wild, and there is every reason to consider it to be a modified form of the wild *Glycine Soja* of China and Japan; but its botanical characters are so unlike those of its ancestral household that Maximowicz — a most conservative botanist — describes it outright as a new species, *Glycine hispida*.

I have now brought to your attention a few familiar plants for the purpose of showing that what are, to all intents and purposes, good species have originated in recent years; and that, whilst botanists demand that the origination of species within historic times shall constitute the only indisputable proof of organic evolution, they nevertheless refuse to accept as species those forms which have thus originated and which answer every demand of their definitions and practice. The proofs of the evolution of species, drawn from the accepted practice of the best botanists themselves, could be indefinitely extended. We need only recall the botanical confusion in which most cultivated plants now lie, to find abundant proof of the evolution of hundreds of types, so distinct that the best botanists have considered them to be species; but other botanists, basing their estimate of species upon origins, have reduced them or reincluded them into the form or type first described. Consider the number of species which have been made in the genus Citrus, comprising the various oranges, lemons, limes, and the like. Recall the roses. The Moss rose and others would be regarded as distinct species by any botanist

if they were found wild and if they held their characters as tenaciously as they do under cultivation. In fact, the Moss rose was long regarded as a good species, and it was only when its origin began to be understood that this opinion was given up. The earlier botanists, who were less critical about origins than the present botanists are, made species largely upon apparent features of plants, although their fundamental conception of a species was one which was created as we find it, in the beginning. Yet, strangely enough, we at the present day, who profess to regard species as nothing more than loose and conventional aggregations of similar individuals, and which we conceive to have sprung from a common ancestor at some more or less late epoch in the world's history, make our species upon premises which we deny, by giving greater weight to obscurity of origin than we do to similarities of individuals.

The fact is that the practice of systematic or descriptive botany is at variance with the teachings of evolution. Every naturalist now knows that Nature does not set out to make species. She makes a multitude of forms which we, merely for purposes of convenience in classifying our knowledge of them, combine into more or less marked aggregations to which we have given the name species. Very often we find in Nature an aggregation of successive individuals which is so well marked and set off from its associated groups that we consider Nature to have made an out and out distinct species; but a closer acquaintance with such species shows that, in many cases, the intermediate or outlying forms have been lost and that the type which we now know is the remainder in a continuous problem of subtraction. In other cases, a form appears to have arisen without intermediate forms, as a distinct offshoot from an older type. This is well illustrated in many remarkably distinct garden forms, which originated all at once with characters new to the species or even to the genus. I have mentioned such a case in the Upright tomato. Even the sudden appearance of these strange forms is proof that species may originate at any time and that it can be no part of our fundamental conception of a species that it shall have originated in some remote epoch. Species-making forever enforces the idea of the distinctness and immutability of organic forms, but study of organisms themselves forever enforces an opposite conception.

The intermediate and variable forms are perplexities to one who attempts to describe species as so many entities which have distinct and personal attributes. So the garden has always been the bugbear of the botanist. Even our lamented Asa Gray declared that the modern garden roses were "too much mixed by crossing and changed by variation to be subjects of botanical study." He meant to say that the roses are too much modified to allow of species-making. The despair of systematic botanists is the proof of evolution!

I repeat that mere species-making, in the old or conventional sense, is an incubus to the study of nature. One who now describes a species should feel that he is simply describing a variable and plastic group of individuals for mere convenience's sake. He should not attempt to draw the boundary lines hard and fast, nor should he be annoyed if he is obliged to modify his description every year. This loose group may contain some forms which seem to be aberrant to the idea which he has in mind; and it would seem as if he should be ready to call them new or distinct species whenever, from whatever cause, they become so much modified that it is convenient, for purposes of identification and description, to separate them from the general type. Just as soon as botanists come to feel that all so-called species of plants are transitory and artificial groups, maintained for convenience in the study of Nature, they will not ask whether they are modified outside the garden or inside it, but will consider groups of equal distinctness and permanence to be of equal value in the classification of knowledge, wholly aside from the mere place of their origin. At the present time, the garden fence is the only distinction between many accepted species and many disregarded ones. The cultivation of man differs from the methods of nature only in degree, not in kind; and if man secures results sooner than nature does it is only another and indubitable proof of the evolution of organic forms. It is certainly a wholly unscientific attitude to demand that forms originating by one of nature's methods are species, while similar forms originating by another method are beneath notice.

If species are not original entities in nature, then it is useless to quarrel over the origination of them by experiment. All we want to know, as a proof of evolution, is whether plants and animals can become profoundly modified under different conditions, and if these modifications tend to persist. Every man before me

knows, as a matter of common observation and practice, that this is true of plants. He knows that varieties with the most marked features are passing before him like a moving panorama. He knows that nearly every plant which has been long cultivated, has become so profoundly and irrevocably modified that people are disputing as to what wild species it came from. Consider that we cannot certainly identify the original species of the apple, peach, plum, cherry, orange, lemon, wine grape, sweet potato, Indian corn, melon, bean, pumpkin, wheat, chrysanthemum, and nearly or quite a hundred other common cultivated plants. It is immaterial whether they are called species or varieties. They are new forms. Some of them are so distinct that they have been made the types of genera. Here is the experiment to prove that evolution is true, worked out upon a scale and with a definiteness of detail which the boldest experimenter could not hope to attain, were he to live a thousand years. The horticulturist is the only man in the world whose distinct business and profession is evolution. He, of all other men, has the experimental proof that species come and go.

Discussion.

Rev. Calvin Terry said that a minister once announced to his congregation, and advertised in the local papers, that he would preach on evolution. His people expected to hear a scientific discussion of the subject. But the preacher started with a living man in view, and confined his remarks to showing the possibility, the need, and the duty of everyone to strive to become a better man, or a better woman,— every Christian to become a better Christian. The preacher's evolution meant, simply growing in grace. A negro preacher undertook to give an account of the creation of man. He said, in dramatic style: "God wet de clay, and formed de man, and set him up ag'in' de fence to dry." One of the congregation, having more sense than the preacher, interrupted him and said: "But massa, who put dat fence dar?" Some, who call themselves scientific evolutionists maintain that somehow things make themselves, and that all existing organisms have been developed from some very low substance called protoplasm. Ever, in science, common sense requires us to believe that we must have something to begin with. We cannot undertake to say that things have come into being without a Creator,— a self-existing, eternal cause. These philosophers sound the deep

sea and draw up mud, and with microscopic eyes examine it, to find something which has the elements of life. But where did that first thing come from! How came it to possess this element of life, with the power to grow — by a long process, and the survival of the fittest — into a Daniel Webster? Everything must be furnished by Creative power, with those elements to be developed. Whatever our theories, we cannot account for the existing organisms without the Creative act of an Infinite, Almighty, and Eternal power.

F. L. Temple said that scientific botanists claim that a species can maintain itself and has done so from the beginning. On the other hand, varieties, so far as we know, cannot endure in competition with original species, therefore they should not be called species.

Professor Bailey responded that seemingly Mr. Temple had brought up a good point; but it is a mere assumption that a wild form, even though it be termed a species, can and will maintain itself. We know that a wild bitter orange exists in Florida; that two forms of wild apples are known in Europe; yet it is known that the latter are not original species, but varieties which persist, the same as species are assumed to do.

A lady said she understood from Professor Bailey's lecture that he did not distinguish creation from development.

Professor Bailey replied, citing Dawson's belief in successive points of creation; and added that the question of ultimate origin of any created thing has no necessary connection with evolution. Creation and evolution are entirely distinct. "In the beginning, God," is the way creation appears to his mind.

William D. Philbrick moved a vote of thanks to Professor Bailey for his able and instructive lecture, and it was unanimously passed.

BUSINESS MEETING.

Saturday, March 2, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

Ex-President William H. Spooner, read a circular asking contributions to a Memorial to Francis Parkman, late President of

the Society, to be erected in the garden he created, and by the shores of the lake he loved so well, both now destined to become a part of the Public Park system of his native city. The circular was signed by Martin Brimmer, Leverett Saltonstall, Henry L. Higginson, Charles S. Sargent, and Lorin F. Deland, Committee.

O. B. Hadwen announced the decease of John J. Thomas, of Union Springs, N. Y., an Honorary Member of the Society, and moved the appointment of a committee to prepare a memorial of him. The motion was carried and the Chair appointed as that Committee, William C. Strong, O. B. Hadwen, and Robert Manning.

The President made the official announcement of the death of Francis Brown Hayes, one of the largest and most constant contributors to the exhibitions of the Society. On motion, the Chair appointed Francis H. Appleton, Arthur H. Fewkes, and William H. Spooner, a Committee to prepare a memorial of Mr. Hayes.

The following named persons having been recommended by the Executive Committee, for membership in the Society, were on ballot duly elected:

George Fred. Harwood, of Newton,
Amor L. Hollingsworth, of Milton,
William Bowen Murphy, of Boston.

The meeting was then dissolved.

MEETING FOR LECTURE AND DISCUSSION.

The following paper was read by the author.

A Talk on Gardens.

By David Hill Coolidge, Jr., Boston.

The origin of gardening arose from necessity, and as necessities increased, desires became greater, more luxurious, and more refined. Thus the Garden developed from an enclosure of a few square feet, to the noble English Park, miles in circumference, its boundaries lost in forest scenery, a gorgeous palace with architectural terraces placed in its centre, and the surrounding grounds ornamented by lakes, rivers, and pleasure grounds, varied with

bowling greens, plantations, flower gardens, hot-houses, orchards, vegetable gardens, and in fact, with all the beauties and gifts of Nature, so useful and necessary to mankind.

From these different objects have arisen the different branches of gardening; and as communication extended over the world, new plants were introduced from every quarter of the globe; fruits and vegetables were improved by selection and various processes of culture. Books were written; societies were established with prizes for individual merit, so that today a vast and voluminous mass of knowledge has been accumulated on the subject of Gardening.

Among these several branches I shall touch upon only one, namely, that of ornamental gardening.

Three important factors have influenced gardens to a marked degree. First, the different nations which have successively flourished in different parts of the world; second, the different forms of government which have prevailed from time to time; and third, the different climates and situations.

Of the gardens of antiquity the first one we hear mention of is that of Genesis, Eden, an enclosed garden or Paradise, in which, according to Scripture, our first parents were placed. The oldest historians represent it as a place of remarkable beauty— each according to his own light and all unreliable. In the same doubtful state is the site of this beautiful garden. The inhabitants of Ceylon, however, seem to have settled it to suit their minds, as they to this day point out Adam's bridge and Abel's tomb; also the tree which bore the forbidden fruit (the *Tabernæmontana alternifolia*), noted for its sweet-scented flowers and the beauty of its fruit, the shape of which gives the idea of a piece having been bitten out of it. The inhabitants say that it was delicious before Eve ate of it, but now it is poisonous.

The Gardens of the Hesperides have been described by a geographer of the sixth century B. C., as situated in a deep basin, with steep sides. They were closely planted with various kinds of trees, among which were the tree of the golden apple — supposed to be the orange — pomegranates, mulberries, olives, almonds, together with arbutus, myrtle, bay, and ivy. But the wonders of these gardens somewhat diminish when facts show that they were nothing more than old stone quarries, which still remain; their bottoms covered with excellent soil in which are planted various shrubs and luxuriant fruit trees.

The garden of Alcinoüs, the Eastern king of ancient times, was situated on the island of Capri. It was placed in front of the palace and was about four acres in extent. The first hedge mentioned in history surrounded this garden, which contained three or four sorts of fruit trees, borders of flowers, and beds of vegetables, while two fountains furnished water in an ornamental manner.

Of the gardens of ancient times those of Babylon were the most remarkable. These were built about 2000 B. C. and were considered one of the wonders of the world. They were four hundred feet square and rose with terraces, one above the other, in the form of steps, supported by stone pillars, to a height of three hundred feet, the top terrace being much smaller than the base. Vast stone beams placed on top of columns held up the terraces. The beams were covered by reeds, cemented with bitumen, upon which were placed a double row of bricks laid in cement. The bricks were covered with lead sheathing to hold in the moisture, and upon this was filled in sufficient earth for the growth of plants. Various kinds of trees were planted in rows along the sides of the terraces, thus giving, at a distance, the effect of a completely wooded hill. The river Euphrates supplied water to these gardens. This was raised and introduced into fountains by machinery. The different terraces contained fountains, parterres, seats, and banqueting rooms. These gardens offered all the splendor and luxury of Eastern magnificence, combined with the more peaceful enjoyment of natural scenery.

The Persian kings were very fond of gardens, which were laid out in quadrangles, with long parallel walks, planted with shade trees set in lines and regular figures. The margins of the walks were planted with tufts of roses, violets, and other sweet smelling flowers of low growth, while interspersed between the trees was every kind of flowering shrub. Formal canals ran parallel to the avenues and generally terminated in a large basin, octagonal in shape and ornamented with sparkling fountains. A tower, from the top of which one had a grand view of the garden, was generally placed in one corner.

These few examples are sufficient to give the general idea of the ancient garden and in looking back upon this period we see that gardening was one of the first necessities, and may claim priority

to every other art. The style was naturally formal, nor does it seem so strange that this method should have been adopted, when one considers that picturesque beauty or other poetical associations with natural scenery as an art of imagination, is one of the very last to have been brought toward perfection.

The second epoch of the art of gardening is from the time of the Roman kings, in the sixth century B. C., till the fall of the empire in the fifth century of our era. Italy furnishes us with the best examples.

In general it will be found that the Romans copied their gardening indirectly from the Persians, and that gardening, like other arts, extended with civilization from east to west.

The first garden mentioned in Roman history is that of Tarquinius Superbus, who lived about 534 B. C. This garden adjoined the royal palace at Rome, and abounded with flowers,—chiefly roses, lilies, and poppies. A formal stream of water is the only other feature mentioned.

The grandest gardens in the century of our Saviour were those of Lucullus, who, influenced by his travels in the East, had contracted a taste for its magnificence and pomposity. He had several villas in the different parts of Italy, so that by moving from one to another according to the season he had a very agreeable time the year round. There still remain near Baiæ, in the Bay of Naples, the traces of one of these villas, which, with its terraced gardens, was situated on an elevated, artificial structure, built out into the sea. The palace and gardens were surrounded by sea water, introduced by subterranean passages from without. From the buildings, gardens, and artificial mountains a most extensive panorama was obtained. It is to the folly and extravagance of Lucullus that mankind is indebted for the introduction of the cherry, peach, and apricot from the East.

Up to the time of Cicero, who died in 43 B. C., an occasional reference had been made to a more natural style of planting than the universal formal method. But Cicero himself combined a variety of natural beauties at his villa. He speaks of groves he had formed there; of the natural streams that passed through them from the surrounding hills; and especially of the absence of all appearance of art, and of all false ornament. Many passages have been left to us by other Roman poets and philosophers, full of the most beautiful descriptions of natural scenery; but this was

seldom carried into the garden, which was treated as a manifest work of art, and it was from this point of view that it was regarded. The garden was laid out with straight lines, and basins of water interspersed with masterpieces of sculpture. A flower garden placed near the terraces generally contained a fountain in the centre. The walks were bordered with box and the trees trimmed and sheared into the forms of birds and animals and other most fantastic shapes as well. Alcoves and summer houses offered places for repose. For planting, the plane tree was much used for shade, while the ivy, acanthus, myrtle, narcissus, and roses were generally found in the more ornamental parts. The myrtle and the bay were held in high esteem for their odors, and the mixture of sweet smelling trees became a point of study. Open groves were of frequent occurrence and they seem to have been the only sort of plantations of forest trees then in use. These were clipped, while the method of planting was that of the quincunx.

At the decline of the Roman Empire, gardening came to a standstill. Through the dark ages the peace and quiet of the world were so disturbed by invasions and all kinds of barbarism, that the more peaceful occupations were abandoned for those of war. Many of the gardens were entirely destroyed, and the taste for a quiet life became almost extinct.

From the end of the eighth to the twelfth century, the monks were the only class in Europe who occupied themselves in agriculture, and it is to them that we are indebted for the preservation of the arts of culture.

With the art of printing, about 1440, came the revival of mental light, and the blessings of peace and commerce, and with the revival of other arts came that of gardening.

The great family of Medici, at Florence, were the principal patrons, and the most celebrated gardens of the beginning of the sixteenth century were those of Lorenzo di Medici. The style was simply that of the past, with the usual alleys of clipped trees, trimmed hedges, fountains, cascades, statues, and topiary work. Such is the Italian style seen today, and one cannot help being impressed by the complete harmony of the house with the grounds, accomplished by the architectural treatment and decorations of the steps, and by the building of terraces and balustrades. The natural style of gardening has never made much progress in Italy, as the Italian mind does not seem to enjoy the charms of a

quiet, country life, or to be greatly influenced by the beauties of Nature.

The formal style was in vogue up to the eighteenth century, in all civilized countries where royal gardens were built. The general plans seem to have been closely allied, but influenced by natural conditions. The most noted example of this style is the gardens of Versailles, built in the time of Louis XIV, under the landscape architect, Le Nôtre. A short description of some of its principal features will give an idea of the whole.

Versailles was built in an age of pomp, display, and vanity, and Le Nôtre seems to have been just the man to sink the extraordinary sum of forty millions of dollars into these gardens. Hardly a style of gardening suitable for the American public at the present time!

As we pass through the palace and take a first look at these gardens, one is impressed by the enormous gravel terraces, which in warm weather the radiation of the sun renders almost impossible to walk upon with any comfort.

There is a central vista which carries the eye for miles into the country beyond, enhanced by means of a formal water basin, a "*tapis vert*," and a long canal-shaped stretch of water. The whole is framed by groves of clipped trees, which save the vista from utter tameness and soften the lines of crude formality. The grounds, on either side of this main vista, are divided into many gardens, some of which are very pleasing with their box edging, clipped yews, and statues, effectively standing against a background of horse-chestnut trees.

The flower borders, typical of the French method, are a combination of ribbon and mixed planting. Along the centre of the borders are lines of permanent, high-growing plants, such as standard roses, small Persian lilacs, etc. These are kept in neat, round heads, and in no way injure the bedding plants. This green line is very effective and saves the border from monotony and over coloring. Around each standard are rings of bedding plants — fuchsias, veronicas, and the like — and between these rings are other plants. On the outside of the border run low-growing plants in straight lines, each of which forms a continuous, separate color; the whole effect is very good.

The *tapis vert*, a large, long, turf avenue, is a delightful place to walk, sheltered by trees and adorned with rows of costly statues and vases.

There is an enormous orangery adjoining the palace, built in the face of the terrace. The collection of orange trees planted in tubs is very great, and the expense is in proportion to the number. The effect does not warrant the cost, for they are only placed out of doors, on the terraces and around the grounds, for about five months during the year. They never bloom, consequently they are never seen with their golden fruit hanging upon their branches.

One of the most pleasing gardens is that of the Bosquet du Roi, near the orangery. It is pleasing because the dreary, decaying formality, so universal throughout the grounds, is here wanting, and in its place we have a most restful piece of turf, surrounded with handsome trees with a few neat flower beds appropriately placed, a small sheet of water, and a few fine foliaged plants scattered about.

The colonnade, a grand example of architectural gardening, consists of thirty-two marble columns, varying in color, forming a circle. Beneath each arch is a marble basin supporting a *jet d'eau*, while in the centre of the open space is a large statue of the Rape of Proserpine. The whole is set off very well, as the structure is placed amidst a thick grove of trees.

The statues and fountains at Versailles are innumerable, the most important of the latter being that of the basin of Neptune. As it costs about two thousand dollars every time it plays, it is very seldom one has the pleasure of seeing it in full effect.

The gardens of Versailles do not belong to the present age, and one feels that they are echoes of the past. To judge the gardens from an artistic standpoint, we must look back and remember they were built for the vain and flippant court, and were used as an out-of-doors ballroom. Their elegance, formality, and pompous display, were in harmony with their use, as shown by the following short description of a fête given by Louis XIV:

"The entertainment was continued for several succeeding days, and supplied materials for an illuminated folio, officially published soon afterwards by the court printer. All the gardens, throughout their whole extent, were illuminated from sunset to sunrise by lights emitted from transparent vases. The branches of the trees were clipped so as to represent different orders of architecture, and musicians in the garb of shepherds, were perched everywhere among the boughs, playing sylvan pipes, flutes, and violins innumerable. Tables were loaded with the most sumptuous banquets.

"Chinese fireworks detained a splendid twilight in the firmament, while the atmosphere was odoriferous with the perpetual splash of scented fountains. Masks and dances alternately ministered to the amusement of the court, among whom the sovereign himself was conspicuous by his silver armor, studded with a profusion of diamonds, and the fire-colored plumes that nodded in his helmet."

It is certainly a great relief to mind and eye to go from these gardens to that of the Petit Trianon, the favorite place of Marie Antoinette, to which she and her chosen friends used to fly from pomp and formality, to enjoy the peace and repose of green fields, verdant glades, and the delicious coolness of naturally grown shade trees. She built there a picturesque little dairy on the margin of a natural flowing stream. The whole effect is one of perfect peace and quiet, in which the lover of Nature takes such delight.

The style of Le Nôtre prevailed throughout England, and he was called upon to make designs for many of the royal gardens of the palaces. As time went on, however, people began to think for themselves, and the influence of fashion to give way to native feeling, and general reasoning.

Milton is generally considered the prophet of natural gardening. In his Paradise Lost, published in 1667, there is a charming description of a picturesque garden. This led to writings by Addison and Pope, which so stirred the public mind that a revolution in favor of a more natural style of gardening was started.

William Kent, a young artist of Yorkshire, realizing the beautiful descriptions of the poets, began in 1730 important innovations. The most conspicuous were the destruction of the walls as boundaries, and the introduction of sunken walls or ha-has, as they were called. These did much to harmonize the lawn and park. Kent was the gentleman who, as the saying goes, "Peeped over the wall and found all Nature was a garden."

Brown followed Kent. He acquired a very great reputation, which reached its height when, by constructing a dam at Blenheim, he produced in a week, a grand artificial lake, the largest at that time in the world. Improvement was the fashion of the day, filling Brown's pockets to overflowing. His work, however, was characterless. He treated all places practically the same, whatever the extent or character of the surface, always surrounding them by a narrow belt of trees, while the intermediate space was

broken up by various circular or oval clumps of trees. A serpentine stream was introduced when possible, perfectly uninteresting from the lack of appropriate planting. So stereotyped had the art become that any one might have guessed what would be the plan given by "Capability Brown," as he was nicknamed, and in fact there was an instance in which this was done.

The monotonous productions of this systematic style soon fell into bad repute, and a desire for a purer taste began to be expressed by intelligent writers, who had much influence on the public mind. Among these was Gilpin. His works were largely read. The beauties of landscape, the effect of light and shade, the grouping and outline of trees, and a thousand and one other attributes of picturesque scenery were for the first time placed before the public in a charming and comprehensive form. His works were published between 1770 and 1790.

Other able writers have left us good works which aim at a purer and a more naturalistic style of gardening; among these are Price, Knight, and Repton.

The tendency of these discussions was to refine the taste and make it more liberal, the outcome of which is the modern style of today, which in general terms may be called one of harmony, in which the beauties of the formal style are often skillfully blended with those of the natural, when necessity so dictates.

And now let us turn our eyes homeward from foreign countries, whose governments and conditions are so different from ours.

America is a country of independent homes, and the laws of inheritance are such that it is almost impossible for large estates to remain long undivided; consequently it is comparatively rare that enormous sums of money are expended on large private gardens. Such sums are rightly spent for the good of the public on our noble park systems, which in the last twenty years have made such grand development that they rank among the first in the world.

I had the pleasure, a few years ago, of showing the President of the London County Council,— Lord Meath, who has done so much to open to the public breathing spaces in the crowded districts of London,— our parks and gardens. His praise was unstinted as we examined the Charlesbank, the Common, and Back Bay Fens, but as we drove on through our beautiful suburbs

and parks, he became less talkative, but was evidently thinking deeply. As we were nearing home he suddenly burst out with the exclamation, "I am perfectly astounded; I had no conception that such work was going on in this country. Well may the citizens of Boston be proud of their beautiful city." And when he went back to his smoky London, and published a little report of what he had seen in America, the parks of Boston were the most highly spoken of. It was good praise, from a source that knew. I speak of this to show to what perfection the art of Landscape Gardening has arrived in our parks. In Boston the hand of a true artist has made them beautiful, and they will be tenfold more so in twenty or thirty years, if the true aim of the designer is ever kept as a sacred trust, and not utterly destroyed by turning portions of the parks into enjoyable but inappropriate features, such as race-tracks, parade, or even circus grounds.

But parks are a very small part of this country, and their beauty alone will do but little in making the inhabited portions of this great continent attractive or pleasant.

The private homes, with large or small grounds, alone have the power to make this country beautiful as a whole, and it is to their owners that we must look for that development of taste, which can produce general good effects. Nor is this simply an æsthetic question; it is one of great importance to the nation, for beauty and attractiveness in the home are the source of much genuine happiness. They continually appeal to a man's better nature and keep him at home, when he otherwise would be away from it. As they sweeten his domestic life, they strengthen his character. Anything that has a tendency to add these blessings to our homes is a good thing for the people to acquire.

I remember once walking along a modest street in Liverpool. It was towards the close of a beautiful June day, and the workmen were returning from their daily toils. The street was composed of small houses, set a little way back from the road, so that each house had a small area of ground about it, which we generally speak of as a garden. There was one lot which particularly attracted me. The principal reason for this was that I could not look into it, owing to an irregular screen of flowering shrubs planted on the inside of the fence. The path leading to the house was curved, while the shrubbery was so arranged at the entrance that I could not even see the house. My curiosity got

the better of me and I became a trespasser. I saw a perfect picture of domestic and happy life on modest means, a problem which many fail to solve. The house was placed on one side of the lot, thus giving all the available space that was possible for a lawn, and doing away with those small and detached pieces of ground which are so hard to treat harmoniously. A gracefully curving path led to the front door, and between the boundary and the path was a plantation of flowering shrubs. The treatment of the rest of the ground was simply that of lawn framed with masses of shrubs, with perennials blooming in the margin of the shrub beds, while a few ornamental trees were so planted as to give shade to the path, and to the most desirable portions of the lawn. The house was of brick and sufficiently clothed with vines to relieve it from that bareness so often noticed with our houses. Projecting from the south side appeared a tiny conservatory with open windows filled with flowers, from the midst of which a canary was bidding his nightly adieu to all the world, as the sun began to sink with golden splendor towards the horizon. On the lawn, a man in his shirt sleeves, evidently having just finished a turn with the lawn mower, was sitting down to supper with his wife, two children, and a dog about him. A feeling of contentment was around the place, and was as pleasing to the mind as was the fragrant bloom of the flowers to the nose and eyes.

There is little danger of the gardens of the wealthy being neglected, although their designs are not always in good taste. It is, however, of great importance to the advancement of gardening that art should be displayed in those that are most numerous and most often seen. These are the small places, and what a lack of art we show in most of these in this country!

The oft repeated remark that "my place is too small to landscape" has some truth in it, as Landscape proper must have space in which to lose its lines in the hazy distance. But no place with a few feet of ground is so small but that it can be made useful, attractive, and pleasure giving.

How often we see a house standing in the centre of a lot, with neither tree, vine, nor shrub anywhere about it, nor any perceptible boundary to indicate that both house and grounds do not belong to the public highway. The only "ornamentation" to be seen is perhaps an old iron pot, burned through at the bottom, supported on three sticks, painted some brilliant color, and filled

with red-hot geraniums, growing over a small pile of stones flaming with nasturtiums. Or, perhaps we see the ugly pile of stones, known as a rockery, covered but a few weeks in the year, with often most inappropriate vines. Good taste is not difficult to acquire, for its foundation is truth and simplicity. But it does require a little common sense, and it is only a small amount of common sense that is needed to tell us that iron pots are not made for ornaments in our gardens.

Places are laid out with a view to their use and enjoyment, and with this in mind let us briefly consider what are some of the principal features that would be desirable in successfully treating the small place. It is obvious that the same cut and dried rules or plans cannot be adapted to any two places alike, for each has its own individual character and problems, which must be solved according to existing circumstances. Let us imagine, however, a small, inexpensive house placed on an average sized suburban lot.

The important living rooms are placed in the southern part of the house on account of the warmth in the winter, the pleasant southern breezes, and the beauty of the western sky at sundown. The entrance is on the north side, and the house is so placed that as much available unbroken space as possible is preserved for the pleasure grounds towards the southern portion of the premises.

As the ground slopes considerably towards the south, the material from excavating the cellar is formed into a small terrace, which offers a suitable plateau on which the house may rest. The terrace wall is of simple field stones, laid dry, with considerable batter. As this imaginary household is very fond of flowers, a small plant room is built out from the dining room, opening on the terrace. During the winter months this is entirely enclosed, but in summer the side sashes are removed, the roof being supported by light pillars on which awnings run. Vines on lattices embower the whole. Here the family often take tea, while enjoying the glimpses of their own grounds as well as the more distant views, which when pleasing have been carefully preserved. The flight of steps on the east side of the terrace leads to a small flower garden, enclosed with a low spruce-pole fence, covered with vines, and on the lawn side to the south planted on the outside with occasional masses of shrubbery to break the monotony of the fence line.

The design of the garden is a quadrangle with a narrow straight path running around it, eight feet from the fence, in which

space is a border six feet wide filled with all the old-fashioned flowers so dear to the feminine heart. In the central space of the quadrangle are a few beds, cut out of the turf, of bright colored plants, which are always kept filled from the border, the higher plants being placed in the central bed. To relieve the flat effect of the garden six pyramidal Arbor Vitæs are introduced, one at each corner of the turf space, and one in the centre of each long side. The dark green foliage forms a fine contrast to the brilliant hues around, and in winter saves the garden from desolation.

The lawn, whose broadest expanse is advantageously seen from the living rooms, runs close up to the terrace, at the base of which are two or three masses of shrubs varying in height. Vines are creeping here and there over the stones, partially hiding them from view. The effect of this planting happily unites the house to the grounds; each helps the other in forming an harmonious picture. The surface of the lawn is carefully modeled into gentle undulations, except where a sufficiently flat space is preserved for lawn tennis or croquet. Where the view of the neighbor's barn obtrusively thrusts itself upon the gaze, the ground near the boundary rises in a decided swell, which is thickly planted with shrubs, at the rear of which several poplars raise their pointed heads, shutting out from view the objectionable feature. The turf of the lawn is for the most part encompassed with bushy foliage planted so as to form little bays, according to the topography of the ground. In one of these little dells is placed a covered seat for quiet reading or intimate conversation, partially concealed from the house by a small isolated mass of shrubs placed between the house and the bay. This mass adds greatly to the effect of distance. The shrubs are planted thickly together, as the general effect is better and more immediate. Due thinning, however, is to be practised from time to time, as a too thick growth may demand. In general, the tallest growing plants are placed next to the boundary, lower ones next, while very low shrubs, creepers, and masses of ground-covering perennials are placed in front of all. The sky line of the planting varies, in some places being high while in others it is low. Thick masses are predominant here, while there they are thin and graceful, forming a picture harmonious in itself, but of endless variety. No isolated flower beds are seen in the lawn to mar this picture, for although pretty in themselves, they are detached

objects, which should be looked at separately; consequently they do not pleasantly intermingle with the graceful forms and effective tints which are characteristic of the lawn. As the place is too small for many large trees, a few ornamental kinds are planted here and there in pleasing conjunction with the shrubs. The laundry yard is placed as much out of the general view as possible, on the north end of the house. It is surrounded by a lattice fence covered with Virginia creeper and honeysuckles.

Such, in general, are a few of the principles which can be applied to our small places, and when they become universal, the art of gardening will have accomplished much for the happiness of man, for as Pope says: "I pity the man who has completed everything in his garden." The art of gardening when properly understood is ever bringing forth new pleasures and perpetual enjoyment.

Discussion.

Rev. Calvin Terry expressed a strong interest in the subject of the lecture. The general subject has many important features, and in speaking of it a selection must be made. He had often wondered why so many persons who have a small piece of ground, as is common in every country homestead, do not have a garden. The possibilities of such a possession are almost unlimited,— vegetables in variety, freshly gathered every day, all through the season, instead of stale ones from the markets at exorbitant prices; choice, luscious fruits through the entire year, beginning with strawberries and cherries, and then other berries in their season; apples, the prince of all fruits, throughout the year; with plums, peaches, pears, and grapes, all in their seasons, and of the varieties preferred; always fresh from the plants or trees, and at a large saving of expense and avoidance of doctors' bills. Again, one's higher nature is aroused, gratified, and developed, for man is not a mere animal. Cultivation of the garden excites an interest in Nature and her works. The spirit of intelligence manifested in every growing thing commands attention and starts into activity one's curiosity; and every effort to gratify this impulse adds to the power to see and to understand better the natural laws of life and growth. The person who thus learns to observe may notice that the roots of a tree will sometimes grow farther on one side than on any other, and stretch out yards or

even rods to where the best food for that plant may be found, indicating that there is intelligence,— a soul, as it were, in the tree. There are twenty-four hours from sun to sun, of which only nine hours are now by law required for a day's work. With no garden to engage one's hands or thoughts at home, the hours for recreation may be passed in dissipation or vice. But if a garden is awaiting attention and service, one may there be entertained by the music of the birds and other voices of Nature. There one may be carried out of narrow self-consciousness and be taught the spirit of morality and of religion, by observing the wonderful operations of Nature as there displayed. Children may there learn of these things, or be taught about them; as the father of George Washington taught him, that effects are always the results of causes, by writing the lad's name in a garden bed, and sowing therein cabbage seeds, which germinating, soon appeared to the boy's great amazement, until his father explained why and how that name was made to appear and thus directed his mind to thoughts of God by whom all things exist. Thus the garden is a profitable possession for the pecuniary, healthful, educational, moral, and religious returns which come from it to the cultivator. And could the *rich* learn to appreciate this mode of recreation and amusement, there would be less need of attempts to kill time by games, yachting, horse racing, and the like, and there would be less danger of life being suddenly and prematurely ended through ennui or excess.

MEETING FOR LECTURE AND DISCUSSION.

Saturday, March 9, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, Nathaniel T. Kidder, in the chair. The following paper was read by the author:

Budding and Grafting.

By Jackson Dawson, Arnold Arboretum, Jamaica Plain.

In preparing this paper on grafting I have gone somewhat away from my subject so as to give you an insight into the records of ancient methods of the growing and grafting of trees in early

times. Many of them you may call absurdities; but as you will see by the following pages, notwithstanding the faultiness of the books on the art of gardening at that time, there are many truths in them which it would be well to observe. What today we call our own inventions we find were practised by the ancients centuries ago, and while their age was one of superstition, in many cases ours is little less so today; as we shall see if we consider that their fallacies have been practised in our own country less than a century ago. Even today, not only the common people, but those who are professed horticulturists, are easily taken in by the glaring descriptions of horticultural products sent out by some of our advertisers. I have seen — right here under the shadow of Horticultural Hall — water chestnuts, bearing leaves of parsley pinned in them, sold to some of our members as something new and curious. It may not have been the ignorance of these members, because they ought to have known better; but it was that same curiosity that so often gets control of the human mind; they want something extraordinary, even if they know it cannot be. They want a change, and if the ancients could have made an illustrated catalogue, showing more impossibilities in the way of fruit and flowers than we find in some catalogues of today, we might call them smart. While there are many conscientious nurserymen and seedsmen who give honest descriptions of the seeds, plants, or flowers they offer for sale, there are many catalogues that are misleading and detrimental to the business. Possibly it is true, as an eminent florist once said, that "there is a new crop of fools every year."

The Origin of Grafting.— Grafting is of great antiquity. It is mentioned by several of the Greek authors —Theophrastus, Pliny, and others— but in a rather unsatisfactory manner. It is referred to by St. Paul in his Epistle to the Romans, chapter XI, verses 17, 19, 23, 24, as follows:

"And if some of the branches be broken off, and thou, being a wild olive tree, wert grafted in among them, and with them partakest of the root and fatness of the olive tree. . . .

"Thou wilt say then, The branches were broken off, that I might be grafted in. . . .

"And they also, if they abide not still in unbelief, shall be grafted in; for God is able to graft them in again.

"For if thou wert cut out of the olive tree, which is wild by nature, and wert grafted contrary to nature into a good olive tree; how much more shall these, which be the natural *branches*, be grafted into their own olive tree?"

It is more than probable that the first idea of grafting originated or was suggested by natural inosculation of branches growing close together in a thicket, whereby the action of the wind, at certain times of the year, had rubbed off the bark of each tree, as you see quite often at the present day, and in a season of calm the two cambiums had been pressed together, had united, and firmly grown together, thereby becoming as one tree. Afterward the original top on one side or the other may have become separated from its own stem and root, and the tree or shrub may have borne two kinds of fruit at the same time. I do not mean by this that if the trees had been of two different species they would have become united, but they might have been closely allied species; for instance, a pear may have become inarched, in this natural way, on another pear; a mountain ash on a thorn; a plum on a peach or almond; or two distinct species of plum or its varieties on nearly related genera. We often see today nurserymen budding or grafting on the peach, plum, or almond, the different species of Prunus, such as *P. tomentosa*, *P. Amygdalus*, *P. Japonica*, *P. triloba*, and others too numerous to mention. However this may be, the art of grafting was practised by gardeners at a very early period. Macrobius, a Roman author of the fifth century, says that the art was taught by Saturn to the inhabitants of Latium. It does not appear to have been known to the Persians or to the Greeks in the time of Homer; and, according to Chardin, was not known to the Persians in his day (1643–1715). Grafting, it is said, was not known to the Chinese till very lately, when it was taught to a few of their gardeners by the missionaries, and to the natives of Peru and other parts of South America by the Spaniards. Some, however, infer from a passage in Manlius, and one in Democritus, that grafting may have been mentioned in some of Hesiod's writings which are lost. Pliny speaks of the mulberry growing on the briar, but whether blackberry or raspberry does not appear. The Romans propagated trees by the same methods now in common use in nurseries; fruit trees were generally grafted or inoculated. Vines, figs, and olives were raised from cuttings, layers, and suckers; willows

were cultivated for binding the vines to the trees that supported them and for making baskets, and they were grown on moist ground as they are today. It was a doctrine held by Pliny, that any scion might be grafted on any stock, and that the scion, partaking of the nature of the stock, had its fruit changed in flavor accordingly. Pliny mentions the grafting of the vine on the elm, and drawing a vine through the trunk of a chestnut, but modern experiments prove the absurdity of the idea that any union can be effected in such cases, even though some of these authors affirm they have seen what they describe. Notwithstanding the ignorance and inaccuracy which these statements betray, the Romans were aware of all our common methods and some of our uncommon ones. They propagated plants as we do; pruned, thinned, watered, forced, and retarded fruits and flowers, and even made incisions and ringed trees to make them more fruitful. One cultivator, C. Furius Cresinus, was so successful as a cultivator of fruits, flowers, and vegetables, that he was accused before the Senate of practising magic, and was obliged to justify himself by showing them his tools. "These," said he, "are the implements of magic which I use; but I cannot show you the care and toil, or the anxious thoughts that occupy me day and night." It is even so today; those who make gardening in any department a success must spend many hours in anxious thought, besides the physical labor.

During the Dark Ages, but for the monks, the art of gardening would have been lost to the greater part of Europe; and many provinces of Europe, which at present are covered with numerous orchards and cultivated fields, nourishing thousands of inhabitants, would have remained a desert or wilderness to this day.

The Greek Geoponica (that is, Horticulturist) was compiled from various ancient authors, both Greek and Roman, more than a thousand years ago. The compiler is commonly supposed to have been one Cassianus Bassus. It contains many useful observations on the cultivation of plants, fruits, and vegetables; but at the same time it is full of absurdities and superstitions. The following extracts about propagation, grafting, and growing of fruits and fruit trees may be interesting at this time: "Grafting can be done in autumn or spring; budding in spring and summer. Grafting is more successful in wet weather, and budding in dry. In dry weather water the grafts every evening. In budding, if

the wood in the billet containing the buds is removed it is weakened; but if suffered to remain the bud will make a more vigorous shoot. In grafting the olive, if the bark is thick, insert the scion under the bark. Walnut seedlings can be taken up, grafted on the roots, and then set out. In making cuttings of grapes have a piece of last year's wood attached to them. Some graft the vine half a foot below the ground, others just at the surface. Inarching is the best mode of propagating the vine; bore a hole through the vine you wish to alter, then pass the branch of the better sort through the hole, and in two years cut off the connection between the graft and its original stock and you will have a good vine. The two vines, of course, are supposed to be planted close together. The quality of fruit of a tree is improved if you graft it over with the same variety, provided your scions come from a tree whose fruit is of better quality. As to the affinities of fruit, the peach may be grafted on the plum, plane tree, or bitter almond; on the bitter almond the peach is rendered more hardy; on the plane tree it produces red peaches. Red peaches are also obtained by pouring cinnabar (dissolved in water) on the kernels just before planting. Graft the plum on pear, quince, or apple; apricot on plum and almond; cherry on the turpentine tree; pears on pomegranate, quince, almond, and mulberry. On the mulberry tree the pears are red. Graft the apple on the wild pear, quince, plane tree, or citron. On the plane tree it produces red apples, and on the citron it bears all the year round. Quinces may be grafted on the oxyacantha. Graft the vine on myrtle, olive, or cherry; on the myrtle, the fruit nearest the stem of the bunch will be myrtle berries; if you work the vine on the cherry, the grapes will ripen in cherry season; this last operation succeeds better if your scions come from a black variety of the grape. Graft figs on the mulberry or plane; citron on pomegranate, mulberry, or apple. On the mulberry it produces red citrons; on the apple black ones. The mulberry succeeds well on white poplar, chestnut, beech, apple, wild pear, or elm; on the white poplar it produces white mulberries. Graft chestnut on walnut; walnut on strawberry tree; myrtle on willow, and laurel on ash. Some graft the roots of olives, if they are above ground, while others propagate it from root slips. Graft pistachia on almond. If you work the vine on the olive, or the olive on the vine, they will produce grapes and olives; the fruit in this case is, as to flavor, a

compound of olive and grape, hence the name Elaistaphylos, that is, olive-grapes."

"I have seen," says Florentinus, "a tree of this description in the garden of Marius Maximus. This olive-grape can also be reproduced from cuttings. Any species of trees can be grafted into the quince or wild fig. When a young vine is too full of fruit, thin it out, for this process improves the size and quality of the remaining fruit. To produce stoneless fruit, split in the middle the part of a cutting, take out the pith, tie up the two parts carefully, and set out the slip. You can also, on the head of a tree, take out the pith without splitting the stock, and carefully insert a peg in its place. This method refers chiefly to grape, peach, and cherry. To bring a barren tree into bearing, gird up your loins, roll up your sleeves, then take hold of an axe or mattock, and being full of wrath approach the tree as if intending to cut it down. Let some one come up to you and beg you not to cut it down, pledging himself at the same time that it will do better next year. Then you, appearing to grant this man's request, will spare the tree, which after this will become a great bearer."

The Object of Grafting in the first place is to perpetuate and multiply and in the shortest possible time, all our choice fruit and ornamental trees and shrubs of value, that do not quickly reproduce themselves from seed or are difficult to grow from cuttings. Nearly all our named varieties of trees and many of the shrubs are propagated by grafting, so that they may the sooner become plentiful as well as a source of income. Should we resort to the propagation of our pears, peaches, plums, apples, and other fruits by cuttings and layers, it would take us many years to reap the benefit of our labors; and many would go hungry while they were waiting for the orchards of Bartletts, Seckels, Angoulemes, and other pears, as well as the Baldwins and many other apples; or the plums, cherries, peaches, and various other fruits. Yet this idea was vigorously advocated a few years ago, both in England and America by those who wanted "nothing but own root trees." Even if it were practicable, which I have reason to doubt, it would not be profitable and I do not know of any one who has planted orchards of our standard fruit trees from cuttings, and gathered fruit from them. Old, or otherwise worthless trees can be regrafted with new or more desirable kinds, and in a few years

made to produce heavy crops of marketable fruit, thus rejuvenating whole orchards in a few years, which, if they had to be replanted with new trees would require at least ten years before they came into bearing. Old vines in graperies can be grafted, and in a short time will give heavy crops of the new varieties. Seedling hybrids of fruits, many of which would take at least ten or fifteen years to become fruit-bearing on their own roots, can be top-grafted on old trees and brought into bearing in a very few years, so that the hybridizer can see the result of his labors, and by the time the original seedling would naturally come into bearing he can have enough to supply orchards for the whole country. By careful selection of stocks trees can be dwarfed, as for instance by grafting the pear on the quince; the apple on the Paradise stock; or the cherry on the Mahaleb. Fruit buds may be grafted into espaliers to supply blank spaces; or other buds to fill up where branches have been lost; or to strengthen the fruit. Plants can be made fertile by grafting in the missing sex in all diœcious trees. Rare species, where only one of a kind has been brought from a great distance, can be propagated and made plentiful by grafting it on some near or allied species, or on its own roots. In small places many varieties of nearly equal vigor can be grown on a single plant. Species or varieties which are naturally delicate become more robust when worked on strong growing stocks. Vines produce larger and finer grapes when worked on more robust sorts, such as the Syrian, or the Black Barbarossa. It has been said that the double yellow roses, such as *sulphurea plena* and others which seldom open their blooms to perfection, grow and flower freely when worked upon the common China rose.

Mr. Knight says that the flower-buds of garden roses worked on wild roses, where they were abundantly supplied with nutriment, gave finer roses than they would have done had they retained their natural position. He reports many similar experiments upon pear and peach trees with similar success; but in the case of the pear, the buds, grafted earlier than the end of August or the beginning of September, became branches instead of flowers.

I have, myself, grafted hundreds of roses from November to March, and had them bloom as well or better than good-sized roses lifted from the ground at the same time. I found that those grafted early, say during December and January, flowered better

than those grafted in February and March; these later ones growing more to wood. The working of trailing varieties of shrubs or trees on tall stocks makes the so-called weeping trees; for instance, the Camperdown elm, weeping mulberry, cherry, salix, *Prunus Chamæcerasus*, and many others, which, on their own roots are trailers or creepers. All sorts of variegated and cut-leaved foliage trees are preserved and multiplied by grafting. It is also employed to aid the healing up of wounds, by grafting on them scions or strips of bark.

Physiology of Grafting.—Grafting and budding are governed by the same physiological principles. There must exist an affinity between the stock and the scion or else there can be no permanent union.

The physiology of grafting is, that the shoots springing from the buds of the scion become united to the stock by the newly generated tissue, which tissue, when once united, determines the ascent of the sap, rising from the stock; which sap, after being elaborated into the true or proper juices by the leaves on the scion, descends by the inner bark. The sap, however, must be sufficiently homogeneous (*i. e.*, must be prepared in plants of the same family) to be readily absorbed by the growing cellules, near which it passes. In other words, each cellule elaborates sap according to its own nature, and if the ascending sap has only an incomplete analogy with the wants of the scion, the latter does not thrive, though the organic union between it and the stock may take place; and if the analogy between the alburnum of the stock and scion is wanting, the organic union does not long continue. Hence, evergreen scions seldom succeed for any length of time when grafted on deciduous stocks, or the apple on the pear, or *vice versa*. Thus, in a physiological view, the epochs of vegetation are the principal points to be attended to, as no plant can be grafted on another which does not thrive in the same temperature. Nor can two plants in which the sap is not in motion at the same time be successfully united. This is because it is only when cellular tissue is in a state of activity — when it can form accretions — that a vital union can be formed and maintained and a reciprocal activity must exist in stock and scion for that purpose. No union can take place between the parts of two plants previously formed, except when both parts are in the act of forming the vital tissue, union being effected only by the coalition of the newly generated

tissue, thrown out by such parts as have the power of generating it. This power does not exist in the heart wood nor in the outer bark, but only in the alburnum or rather the substance imbedded between the alburnum and the inner bark, constituting the cambium.

Mr. Knight says the effects produced upon the growth and product of a tree by grafting are similar to those which occur when the sap is impeded by a ligature or by the destruction of a circle of bark; it acts by obstructing the descending sap, and so causes fruitfulness. The modification effected by the graft therefore is a subject of practical interest and importance to the grower or cultivator, for although the graft alters neither the species nor the variety of the stock it has considerable influence on its habits as well as on the production of fruits and flowers.

Affinity of Species. Graft and Stock.— Plants of the same family have an analogous origin and can be grafted only on one another with a prospect of success. The success of the operation, even within the family limits, will not always be complete; perhaps from some difference in their organic structure. In such cases practical experience must necessarily become our guide. The pear and the apple can be united only for a short period. Soft-wooded plants do not succeed well with hard-wooded ones, nor ligneous plants with herbaceous ones. The peach and the apricot are grafted on each other with difficulty, while both do well on the plum. Most cherries do well on the Mahaleb, but the Mahaleb does not succeed well as a graft on other cherries. The sweet chestnut will graft on the oak, but will not on the horse-chestnut. The medlar, which has solitary flowers, does well on the thorn, whose flowers are in corymbs. The Chionanthus, so nearly allied to the lilac with its panicled flowers and simple leaves, will do well only on the European or flowering ash, which has compound leaves. The Photinia, allied to the beam tree (*Pyrus Aria*), and the Eriobotrya, allied to the medlar, both evergreens, will graft on the medlar, and not on the hawthorn. The cotoneasters, amelanchiers, and *Pyrus Aria* all do well on the hawthorn, and by experience last longer, but make slower growth than they do on the mountain ash. *Pyrus arbutifolia* grafts well as standards on the mountain ash. *Berberis aquifolia* will grow on the common barberry, and *Prunus Lauro-Cerasus* does well on the Bird cherry.

In almost every case the grafting of deciduous plants on evergreens has proved a failure. It is always best to unite by grafting only such plants as have some analogy between them, such as vigor, time of commencing to grow, and hardiness. If any difference exists it should be that the graft be later than the stock in vegetating, and also more vigorous and hardy. Weak stocks and weak scions produce worthless trees. When a weak scion is grafted on too vigorous a tree it is difficult for the scion to absorb all the sap furnished by the stock, and an evenness of growth cannot be established between the stock and the graft; then follow weakness and disease. It is preferable to have the scion stronger than the stock; for instance, the pear on the quince and the cherry on the Mahaleb; otherwise the tree will be less vigorous than if perfect harmony exists between the two parts, and growth being thus tempered tends more to the production of fruit. The French often double-graft a tree to make its growth more uniform; for instance, a strong-growing stock is grafted with one of an intermediate growth, and on the latter the variety they wish to propagate; the stock should always be strong enough to receive the scion, for if it is weakly, although the graft and stock may unite, it will almost always make a sickly tree.

Practical Directions.— The term grafting is usually confined to the operation with detached scions; and in every kind of grafting it is essential that the two parts (the scion and the stock) be in close communication with each other, not by the wood or bark, but by the inner bark or alburnum in the tissue of which the cambium flows. The more points of contact here the greater the chance of success, which also will be assisted by a similarity of texture between the scion and the stock.

The best season for grafting out of doors is in the spring, when the sap is in motion (say from March to June); and for grafting under glass, from the first of August to the last of September, with half-ripened wood; in December and to the last of March, with dormant wood. During the midsummer days grafting either in doors or out is not often a success, although with great care it might be accomplished the year round. In all kinds of grafting it is better to have the stock started a little ahead of the scion, and it is not safe to graft out of doors with scions that are started unless you can cover up or shade them; for the evaporation that takes place at this time weakens the scion too much

before it has time to unite with the stock. A calm atmosphere and warm temperature, rather than wet and cold weather, are more conducive to success, and certainly more agreeable to the operator than when it is cold and stormy. The stone fruits, such as cherries and plums, should be the first ones operated on; afterwards the pears and apples.

The tools necessary for use in grafting are a saw, a pruning knife, grafting iron or wedge, a budding knife, a pair of good pruning shears, a whetstone to keep your knives in good condition, a bunch of raffia, bast, or waxed cloth for tying the grafts and keeping them in their places when set; also some kind of grafting wax to cover the wounds to protect them from the air and water. A number of grafting machines have been invented, especially in France, where, since the ravages of the Phylloxera, these machines have been in great demand, as they were thought to be of great advantage in grafting the grape; but an expert workman will do the work quite as well with the tools named above. There are many varieties of grafting wax and mastic, as well as other compositions for the same purpose. In the old times a composition of clay, cow manure, and chopped straw was used, and is used by some even today; and as it retains moisture better than the modern grafting wax it is recommended for coarse work and for covering large wounds in large operations.

For grafting in the open air the following compound is much used in this country: common rosin, four parts; beeswax, two parts; mutton tallow, two parts; all melted together. When cool it is applied by the hand, or, being melted, applied with a brush.

In many large nurseries, where apples and pears are grafted in winter, this wax is heated and applied thinly with a brush to sheets of cloth, and after becoming cool the cloth is torn into narrow strips and used in tying up the grafted roots and plants. I have found that where only a limited supply is wanted, it is cheapest to buy it already prepared, and for years I have used that which is sold by nearly all seedsmen as Trowbridge's grafting wax; it is as good as, or better than, any of the French mastics.

All scions should be cut before the sap begins to flow rapidly (say from January to the middle of March) for all trees that are hardy, and whose wood is not injured by freezing. But many plants with slender stems are injured by freezing and if scions

from them are wanted to propagate by grafting, they should be taken off in early autumn and heeled-in in loam, sand, or moss, in a moist pit or cellar for future use. I have found this especially applicable to hybrid roses, where the wood is wanted for winter use. A great loss of grafts is sure to be the result if you do not have the wood thoroughly ripened and taken off early in autumn and buried in the earth. Ten degrees of frost will injure many varieties of rose grafts. In selecting scions bear in mind that the wood should not be too coarse but of medium texture, healthy, and well ripened; nor should you use fruit buds, unless you want them for a special purpose; although at times we often have to use any wood we can get for scions, especially in the case of varieties which from any cause are scarce; but as a rule it is a bad policy, and as soon as possible, new or stronger shoots, from the one so grafted should be grafted on young vigorous stocks. This is an essential point and should not be overlooked, that weak or sickly scions grafted on sickly stocks soon produce a degenerate race. In good nurseries, where careful attention is given to these points, the stock trees are carefully pruned (or ought to be) and cultivated on purpose to produce a healthy stock of wood for grafts or other uses. The grafts should not be cut from the scion until just before they are to be used. Never allow scions to suffer from exposure to dry air, cold, or wet. In collecting scions of evergreen trees, I think it best to cut them from the parent plant just at the time of using them. If you must keep them over winter the best way is to lay them thinly in sand, and keep in a deep pit or cellar where it is cool and somewhat moist; if they are put in too thickly they will heat or rot.

The Methods of Grafting.— These are so numerous that a systematic classification of them would be difficult. It would only be a waste of time to try to enumerate them all, as that would be of no practical value except to show in how many different ways the work can be done. Almost every propagator has his favorite style. Those methods that are practised by skillful propagators are best; they are few and may be summed up as follows:

Inarching, or grafting by approach,
Bottle grafting,
Cleft grafting,
Side grafting under the bark, or inlaying,
Crown grafting,

Saddle grafting,
Splice, tongue, or whip grafting,
Root grafting,
Veneer grafting.

Inarching or Grafting by Approach.— This is without doubt the most ancient of all grafting methods. From time to time Nature gives us examples of it in roots or trees which have become united where they have been bruised or pressed together. Man was no doubt quick to perceive and take advantage of this hint and when once tried, to improve on it. This method is practised both in doors and out; and at one time was extensively used by both nurserymen and gardeners. When I was a boy it was about the only method in use for the propagation of azaleas and camellias. It is even now employed by some to propagate varieties which are difficult to graft otherwise.

The time for inarching out of doors is from early spring until July or August, while the tree is in active growth, and as the scions are still attached to the parent plant they can be inarched in either a woody or herbaceous state. Under glass it can be done at all seasons of the year. The simplest method is to remove from both the stock and scion plants a thin slice of the bark and alburnum from two to three inches long; then, bringing both cut surfaces together in such a manner that they shall fit exactly, to tie them firmly with bass or raffia, and cover the wound with grafting wax to keep out the air.

Another kind of inarching is similar to tongue grafting. An incision is made in the stock and the graft, and the two are bound together and waxed. Sometimes the top of the stock is cut off and tongued at the time of grafting, and the graft is joined at the cut extremity. Another way is to cut off the stock and cut out a V; the scion is then cut on both sides to fit into the stock, then inserted in the V and completed by tying carefully as in other cases. This method is much used in grafting high standard weepers, which are then tied carefully and waxed as has been directed. In grafting by this method, the trees or plants to be grafted must be in close proximity to each other. The scion plants must be either planted around the stock tree or in pots and so arranged on stands as to be easily brought in contact with the branches of the stock tree.

Grafting by approach is also used to fill up vacancies in graperies and fruit houses, to restore main branches, or increase the size of the fruit. When the graft has taken hold, cutting it from its parent stem is an important matter. It must not be done too hurriedly, but gradually, making a small incision at first, and increasing it from time to time, until the final separation is made. This may require several weeks. As soon as this is done the wound is cut smooth and covered with grafting wax.

Bottle Grafting.— This is only another method of grafting by approach. The lower end of the scion is buried in moist soil, or is inserted in a bottle of water, to keep it in good condition until the cut surfaces are united. In all other particulars it is identical in principle with inarching.

Cleft Grafting.— This system was practised at a very early date, and is a method much in use now, to top-graft old trees in orchards, or to renew individual trees, as well as young stocks that have become too large to bud, and in order to bring them into bearing more quickly. This was probably one of the first kinds of grafting that the Pilgrims used in the new world, and for a long time was practised the most of any kind. But, compared with other methods, it is rather crude, as there is a large amount of cut surface to be healed over by the new growth, which often takes a long time. In cleft grafting the stock is cut off with a saw, at a point at which to insert the scion. This surface is smoothed off with a sharp pruning knife. Then with a knife, a grafting iron, or thin chisel, split the stock through the centre, being careful to divide the bark at the same time so as to leave the edges smooth. The cleft is kept open by means of a wedge. The scions are then cut in the shape of a wedge, and fitted into the cleft (one on each side if the stock is large) taking care that the two cambium-layers meet on the edge near the bark. If the stock has very thick bark slightly incline the lower end of the scions inward to the cleft to make sure that some part of their cambiums may come in contact with the cambium of the stock. In large stocks it is not necessary to bind the graft before waxing; but in smaller ones it brings the parts into closer union and holds them there. When the stocks are small it is not necessary to put in two scions, or to split the stock entirely across, but only part way, holding the cleft open with a knife while inserting the scion. This is a much better way when it can be done, as there is less cut surface to be covered.

When the stock is very large, more than two scions can be used by making two parallel clefts, so placed as to leave the pith in the centre untouched. March and April comprise the usual time for grafting out of doors. Cleft grafting can also be performed in the latter part of the summer by using well-ripened wood. The grafts would make no growth but would merely become united. Terminal cleft grafting is only a modification of cleft grafting, and is done by splitting the bark through the terminal bud without heading down the stock. The scion is cut with a regular double slope and inserted the same as in any cleft grafting. The stock and scion are then firmly bound together. As soon as the stock and scion begin to grow, the shoots are pinched but not cut off, as they draw the sap towards the graft, which is essential in plants that are slow to unite. This kind of grafting is used on both the walnut and the fir tree.

Side Grafting.—This term is applied to a number of processes of grafting in which the head of the stock is not cut away. The most simple side graft is that in which the scion is cut with a long splice, perfectly smooth and thin to the bark. Then from the stock a thin strip of bark and wood two or more inches in length is cut. Fit the barks exactly together and bind firmly. This is a favorite method of grafting the camellia and azalea, and should be done under glass. In side grafting with a vertical cleft, the scion is cut half its length on both sides in the form of a thin wedge. The stock is cut with one stroke of the knife, allowing the blade to penetrate the alburnum. The scion is then thrust in the cleft thus made and held in its place by a ligature of bass or raffia. This kind of grafting can be used for camellias, or in fact any plants under glass. It is especially used in herbaceous grafting, such as chrysanthemums, potatoes, tomatoes, coleus, cacti, and other succulent plants. In succulent plants it is not necessary to pare them down as thin as in woody ones, but to leave them more in the form of a wedge. Side grafting can also be done under the bark in spring when the stock is in an active state of vegetation, so that the bark will lift easily from the wood, as in the case of budding. The scion is cut with a long splice, thin towards the point. An incision is made in the bark as in T budding, cutting through the bark but not into the wood. The bark is then raised and the scion slipped under it. It is then tied and covered with grafting wax, to exclude the air. There are other systems of side grafting, but they are only modifications of one another.

Crown Grafting is similar to cleft grafting. It is practised in spring, as soon as the bark is easily separated from the wood, the stock being headed down several weeks before the time of grafting. The scions should be cut with a flat, sloping cut on one side; but instead of splitting the stock the bark is divided from the top downwards an inch or more, and lifted as in budding. The scion is then inserted under the bark. A small implement of wood or ivory, made in the form of the scion, can be used to advantage in preparing a place to insert the scion much more easily than by lifting the bark with a budding knife, and with less fear of bursting the bark, or injuring a tender scion. In another form of crown grafting, the scion is cut half way through and the wood removed, leaving a square shoulder at the top near a well-developed bud. A corresponding strip of bark is removed to admit the scion. The two parts are then fitted together and bound with waxed cloth, and the top of the stock as well as that of the scions is then covered with wax to prevent evaporation.

Saddle Grafting.— By this method the stock is cut, with a slant on two sides into the form of a wedge, while the scion is cut just the reverse, so that when in position it stands astride of the stock. But it takes more time than other forms of grafting. The rhododendron is now largely grafted in this way.

Tongue or Whip Grafting.—This method is most commonly used in nurseries, for grafting fruit trees, where seedling stocks from one to three years old are used. The stock and scion are nearly of a size. The scion is prepared with a long sloping cut, and the stock in the same manner. A small cleft or split is also made about midway of the cut portion of both the stock and scion, forming a tongue on each. These tongues are inserted into the cleft in the other part, thus forming what is called a tongue or splice graft. They are then bound with waxed cloth, heeled in, in boxes about a foot in depth, in finely sifted sand or loam, and kept in a moist cellar until spring, when they are put in a warm place until they show signs of starting. They are then planted in nursery rows, covering the graft to the first eye.

Root Grafting.— Many plants, that are difficult to grow from cuttings, can be successfully grafted on pieces of roots, either their own or those of another plant. Many woody plants, of which we have no allied species, can be grafted on pieces of their own roots.

All methods of grafting can be used in root grafting; whip, splice, side, cleft, or veneer. Always cut the roots as they grow from the stem, keeping the neck up. Plants that grow from root grafts are numerous. The pæony, bignonia, wistaria, rose, hydrangea, clematis, chestnut, plum, pear, apple, dahlia, magnolia, and many others can be root grafted. Sometimes when we receive a new plant and can find no stock to work it on, I cut off a few of the roots and graft them with their own branches. I tried to propagate *Cæsalpinia Japonica* for two years from cuttings, but did not succeed. Last fall I dug up the plant, selected some of its best roots, and veneer grafted some of the best shoots upon them; now I have several plants. *Hydrangea vestita*, a hard plant to grow from cuttings, does well on the roots of *H. paniculata*. *Combretum purpureum*, a rare stove climber, can be grafted on its own roots. *Euptelea polyandra*, a scarce Magnoliaceous plant, and many others, can be worked successfully in the same way. When I speak of root grafting, I mean pieces of detached roots — not seedling plants, cut down and grafted on the crown. For many plants, grafting on the crown of the root will be better than on the stem, on account of the softness of the tissue beneath the ground surface. This is a favorite way with roses, so as not to have them sucker from the roots.

Veneer Grafting.— This is one of the best methods of propagating hard wooded plants under glass, and can be practised from November to April, and from August to October. In this mode of grafting the plants should be established in pots for the convenience of handling, as well as for the success of the operation. Seedling plants are the best, but many varieties can be grown from cuttings or layers. Pot the plants in early spring, and plunge them in frames or in a sheltered position, giving them attention, as to watering and pruning, during the summer or until wanted for use. In grafting, select a smooth place on the stock, and with a sharp knife make a slight cross cut downwards in the stock, cutting through the bark and slightly into the wood. Then insert the blade two or more inches above, cutting off a thin slice of the bark down to the cross-cut. A corresponding slice is taken off the scion. They are then fitted together so that the two cambiums meet, then tied firmly and placed inside of the greenhouse in close frames, and slightly sprinkled overhead when necessary. Keep the plants close for the first few days and syringe when

necessary to keep up a moist atmosphere. As soon as the plants begin to knit together, air can be given during the morning and evening, and after a week or two the air can be kept on all day. The time taken by the different varieties to unite varies from two to four weeks. After the grafts have begun to unite, they should be removed from the frames, but kept inside the greenhouse for a month or more before being planted out or removed to their winter quarters. My method has been, as soon as I am certain the grafts are all right, to turn them out of the pots and transplant them thickly in boxes. As soon as they are well established they are put out of doors in a sheltered place to harden off. When no double frames are at hand, I have found a bed of sphagnum moss, three to four inches deep, a good substitute, laying the plants on their side, and covering the base of the graft an inch or two with damp — not wet — moss. This gives out a gentle moisture, and the graft is not subject to sudden changes of temperature, as it would be otherwise. All coniferous plants are much more easily propagated by veneer grafting than by any other method. Their treatment after grafting is similar to that of other plants, except that they should not be headed in until the second year.

Budding.— This consists in taking a bud with a portion of bark attached to it, from one tree, and inserting it in some portion of another, or in the same tree. In order to do this, a longitudinal incision is made through the bark of the stock, to the wood; a cross cut is then made at the upper end forming a letter T, into which a bud, previously prepared, is inserted, either with or without removing the inner wood from the bud. In budding, it is necessary that the bark of the stock should part readily from the wood without being torn. If the bud is inserted when the flow of sap is abundant, it immediately comes in contact with the nourishment it requires for its support. In budding, it is necessary to have a budding knife to prepare the buds, and for opening the bark to admit them; also tying material to hold the buds in place after they are set. In selecting the buds, the young shoots of the previous year's growth are the best — neither too gross nor too weak. The best buds are those about the centre of a stem or shoot. As soon as the scions are cut, the leaf blades should be removed, leaving a small portion of the leafstalk attached to it which facilitates the handling of the bud. Buds should never be

allowed to get dry, nor should they stand in water too long. Unless they were shriveled when received, damp moss or cloth is the best material to keep them in.

Shield Budding.—This is the method most practised in nurseries. It is done from July to September, according to the kinds and varieties of plants to be budded. There are many forms of budding; such as budding with a cross-shaped incision for chestnuts or other plants with large buds; and inverted budding, when the sap is in excess, as in the maple.

Veneer Shield Budding.—This method is sometimes employed when the sap does not flow freely enough to allow putting the bud under the bark. It consists of an oblong, four-sided strip of bark, marked with four cuts, leaving the eye or bud in the centre. This strip of bark is lifted with the budding knife, and removed with the bud from the scion. A corresponding strip is taken from the stock, and the prepared bud is fitted into its place, and treated the same as any bud.

In many places, especially in Holland, double budding is practised on roses; that is, two buds are inserted opposite each other in the same stock. There are various other methods of budding used, but the common shield budding I have described answers all purposes, and is almost universally practised. In preparing the bud, take the shoot in your left hand; then at about a half-inch above the bud, cut through the bark and a little into the wood back of the bud, and the same a half inch below it; next make a horizontal incision in the stock first, and from this make another incision downwards, about an inch long; lift up the edge of the bark by passing the blade up to the horizontal position, at the same time holding the bud by the leafstalk; slip it into the incision as quickly as possible, so that the bud shall not become dried. If the upper part of the bud does not fit, it must be cut across so as to allow the bud to sit firmly on the stock. When the bud is fitted, bind it with bass both above and below, leaving only the bud and the leafstalk exposed. At the end of a week or ten days the ligatures should be looked over to see that they are not strangling the stock. If they are cutting into the stock they need to be loosened only, as it is not always safe to take them away entirely. Budded stocks are usually headed down to about six inches above the bud the following spring. As soon as the buds begin to grow,

it is necessary to tie them up to the stalk that is left. Disbud all suckers from the stock, before they get too strong, by rubbing the hand quickly up and down the stalk while these shoots are young. When the buds that were inserted are a year old, the old stems should be cut off smoothly to heal over.

In the propagation of plants by grafting, it is fully as necessary to know the kinds of stocks to work on, as it is to know how to perform the operation, and while I have not the time at present to speak of all the stocks used, I will give a list of the principal ones.

The five-leaved pines, such as *Cembra*, *parvifolia*, and others, all do well on *Pinus Strobus;* and on *P. sylvestris* (the Scotch pine) and *P. resinosa*, all the rest of the pines will succeed. *Picea excelsa* will do for all the spruces, while *Abies pectinata* and *A. balsamea* will serve well for the Silver firs. The common arbor vitæ *(Thuja occidentalis)*, and *Chamœcyparis pisifera* make good stocks for the *Retinosporas*. Almost all junipers do well on the red cedar, *(Juniperus Virginiana)*. The common hemlock *(Abies Canadensis)* is good for all the varieties except *A. Douglasii* and *A. Mertensiana*. On the common European larch, *(Larix Europœa)*, you can graft all the varieties, excepting *Pseudolarix Kœmpferi*. For Rhododendrons, the general stock used is *R. Ponticum*, but *R. maximum* might also be used. All deciduous Rhododendrons (Azaleas) can be grafted on *R. viscosum* or *R. nudiflorum*. All types of *Kalmia latifolia* can be worked on the species. Most varieties of Amelanchier, some forms of mountain ash, and *Pyrus Aria* and varieties, make good plants when grafted on the hawthorn. All apples will thrive on seedling stocks, but while *Pyrus Toringo* and *P. baccata* varieties will grow on the common apple, they do better on seedlings of *Pyrus baccata*. *Prunus mirobalana* makes a good stock for nearly all plums; and all of the flowering section do well on it, such as *Prunus tomentosa*, *P. triloba*, etc., and I think the Peach is longer lived when worked on the plum. *Pyrus communis* is a good stock for all species and varieties of pear, except for dwarfs; although if it were plentiful enough, *Pyrus betulæfolia* would make one of the best of stocks for pears on high light ground. The Manetti, brier, and multiflora are best for most roses. All lilacs will succeed well if grafted on the privet and lilac; but I think, if it were plentiful enough, *Syringa villosa* would make a much better stock for them. Clematises graft easily on the roots of *Clematis Flammula*, and

C. paniculata. *Cornus florida* makes a good stock for all its varieties. *Parrotia Persica*, *Hamamelis Japonica*, and others will graft on the common witch hazel. All lindens can be grafted on the American or European varieties. *Vitis Labrusca* and *V. æstivalis* make good stocks for all hardy grapes. *Euonymus Europæus* is a good stock for all the Euonymus family. *Acer platanoides* does well as a stock for all the forms of maple excepting the Japanese maples, which will grow only on *Acer palmatum* or *A. Japonicum*. *Robinia Pseudacacia* is good stock for all the species and varieties of Robinias. All Wistarias grow well on the roots of *W. Chinensis*. *Caragana arborescens* suits all the Caragana species and varieties, and also *Halimodendron argenteum*, and possibly other Leguminosæ. *Viburnum opulus* and *V. dentatum* make good stocks for all Viburnums; *Catalpa speciosa* for the other Catalpas, and for *Tecoma radicans*. *Ulmus campestris* is best for all the English elms, and *U. Americana* for the American types. *Quercus rubra* is best for most of the oaks, although I believe the red oaks would do better on *Q. rubra* var. *tinctoria*. All the hornbeams and hop hornbeams, work more readily on *Carpinus Betulus* than they do on our own species. The European white birch *(Betula alba)* is the best for the general run of birches, while *Alnus incana* does well for the alders. *Corylus Avellana*, the English hazel, is a good stock for all the species and varieties. The common horse-chestnut *(Æsculus Hippocastanum)* is good for all its varieties, as well as the red and the yellow buckeye, *Æ. rubra* and *Æ. flava*. The fine varieties of hickory will graft on *Carya porcina*, and *C. alba*, but I believe they will graft more easily on *C. amara* (the bitter-nut); it is of much more rapid growth than the other hickories, and while young the tissues are softer. The common chestnut is a good stock for all the Japanese, English, and Spanish chestnuts. *Cerasus sylvestris*, (the Mazzard cherry), is as good a stock as can be found for standard cherry trees, and *C. Mahaleb* will serve well for dwarfs. *Prunus demissa* will graft on *P. Virginiana* but not on *P. serotina*. The American and European beeches make equally good stocks for all varieties of that genus. *Gleditschia triacanthos* is a good stock for the weeping, and also for all Japanese varieties. *Pterostyrax hispidum* makes a hardier plant if grafted on the Halesia, than it does on its own roots. *Magnolia tripetala*, or umbrella tree, and *M. acuminata* (the

cucumber tree) make good stocks for all deciduous magnolias. The umbrella varieties have more roots and are more easily transplanted.

Discussion.

Mr. Dawson exhibited many drawings illustrative of the several methods of grafting and budding which he described. He also brought a large number of living plants, which had been budded or grafted, and which represented not only all the methods of which he had spoken, but the practical application of each to a great variety of plants, including evergreen and deciduous, hardy and tender, trees, shrubs, and vines. At the conclusion of his lecture, many from the audience gathered about him, to examine his exhibits; to question him as to details; to witness the practical illustrations which he gave, and to hear his explanations of details as he performed the operations.

Shield budding, he said, should be the method used on most nut-bearing trees, as it proves the most successful one for them.

Where one has a rather light sandy or gravelly soil to be used as a fruit garden or orchard, he thought *Pyrus betulæfolia* would be the best stock on which to work pears, being naturally adapted to thrive in such a soil.

In grafting beeches the work should be done near to the surface of the ground, to secure the best results.

Never bud or graft grape vines, until the stock plants are in full foliage; otherwise bleeding may ruin the whole work, and even kill the stock plant.

MEETING FOR LECTURE AND DISCUSSION.

Saturday, March 16, 1895.

A meeting for lecture and discussion was holden today at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The following paper was read by the author:

Some Notes on Tomatoes.

By W. M. Munson, Horticulturist to the Maine State College Agricultural Experiment Station, Orono, Me.

Next to the potato, the tomato stands, perhaps, at the head of the list of garden vegetables in commercial importance. In

Maryland alone there are as many as twelve thousand acres devoted to this one crop, while in New Jersey, Delaware, Ohio, Indiana, and Illinois, the crop is of special importance.

By far the larger portion of the area devoted to this crop is employed in supplying fruit for the canning factories, and it is this demand of the canneries which, more than any other, has given the great impetus to tomato culture. The credit of introducing canned tomatoes as an article of trade is due to Mr. Harrison W. Crosby, who made his first venture in 1848, while steward of Lafayette College, Easton, Pennsylvania. There was a ready demand for the goods, and with increased supply and improved machinery, the cost has been reduced from fifty cents per can, in 1848, to seven cents at the present time.[1] With this reduced cost, the output of the factories has increased to an almost incredible extent. The total output for 1894 was nearly six million cases of two dozen cans each, as compared with less than three million in 1887.[2]

Classification and History.— Our garden varieties of tomatoes belong to two distinct species — *Lycopersicum pimpinellifolium* Dunal, and *Lycopersicum esculentum* Miller. The former is represented in the garden by the "Currant," or "German Raisin" Tomato, which is of weak spreading habit, with small thin foliage and very delicate flowers, arranged in two ranks on a long raceme. The whole aspect of the plant is delicate, and the long racemes of fruit are not unlike clusters of currants. This species is found wild in Peru and Brazil, and but little is known of its history. It has not been modified by domestication, and probably has not been long under cultivation. The chief value of this species, aside from its use as an ornamental plant, and to a limited extent for preserves, is in the breeding of new types, as I shall suggest in another connection.

Lycopersicum esculentum, the ordinary tomato, is undoubtedly a native of Peru, but is spontaneous or indigenous throughout Mexico, and as far north as Texas and California, in a form closely approaching the Cherry tomato of the gardens. So far as we know, it was first cultivated in the south of Europe. It is

[1] Am. Grocer, Jan. 11, 1893.
[2] Ibid, Jan. 9, 1895.

mentioned as early as 1561,[1] while in 1583 "the fruit was eaten upon the continent, dressed with pepper, salt, and oil.[2]" It was grown in England in 1597,[3] but for many years was used only for ornament. In 1700[4] Tournefort mentions seven varieties, one of which was pale red, one striped, two yellow, one white, and two red; but the culture was still neglected, for in 1819[5] only four red varieties are mentioned, and the pale red sort is not named.

England was much behind the Continent in the general culture of the tomato, but our own country was still later. The fruit is said to have been introduced into Philadelphia by a French refugee from St. Domingo in 1798,[6] and in 1806 M'Mahon writes: "The tomato is much cultivated for its fruit in soups and sauces, . . . and is also stewed and dressed in various ways and very much admired."[7] It was introduced into Salem, Mass., about 1802 by an Italian painter, Corné, "but he found it difficult to persuade the people even to taste the fruit."[8]

The tomato began to be cultivated for market in this country about 1829, but not until 1839 was it mentioned in the premium lists of this Society.[9]

Variation in the Type.—As before remarked, the Cherry tomato of the gardens approaches very nearly the wild type of the species, but the tomato is one of the most variable fruits we have under cultivation, and is readily susceptible to the influence of selection. Its variability lies mainly in size, form, and number of cells, and, as shown by Bailey,[10] the latter character may, to a large extent determine the former. In nature there is a definite number of cells in the fruit of any given species, but one of the first effects of cultivation is to render this character inconstant. In our cultivated varieties of tomatoes, we find almost as many different forms and combinations of cells as there are individual fruits. In the wild type there are normally two cells. The effect of cultivation has been to increase the size of the fruit by the interposition of new cells, this condition resulting in the angular shapes characterizing many of the garden forms. In

[1] Anguillara, Semp., 217.
[2] Dodonæi Stirp. Hist., 455.
[3] Gerarde, Herball, 1st ed., 275.
[4] Inst. Rei. Herb., I, 150.
[5] Trans. Lond. Hort. Soc., III, 347.
[6] Manning, Hist. Mass. Hort. Soc., 40.
[7] M'Mahon, Gard. Calendar, 319.
[8] Felt, Annals of Salem, II, 631; cited by Manning, Hist. Mass. Hort. Soc., 40.
[9] Manning, Hist. Mass. Hort. Soc., 248.
[10] Am. Naturalist, June, 1887, 573.

other words, the modern large fruited and irregular sorts have been developed first by the augmentation of cells in the primitive type, and later by the modification of the flower, and the production of an abnormal number of parts.

The direction of variation and order of development suggested by Bailey[1] seem most natural. Starting with the Cherry tomato and adopting, slightly modified, Bailey's expression of the evolution of forms we have:

CHERRY:
- *Pear-shaped and oblong sorts*,— King Humbert, Nisbett's Victoria, etc.
- *Angular sorts*,— Orangefield, Hundred Day, etc.
- *Yellow apple-shaped sorts*,— Green Gage, White Apple, etc.
- *Large red sorts*,— Little Gem, The Cook's Favorite, and thence to Paragon, etc.
  - *a*. Grandifolium,— Mikado, Potato Leaf, etc.
  - *b*. Validum,— Tree Tomato.

The history of the introduction of our common sorts is, no doubt, familiar to most of you. The old Large Red of the earlier catalogues was followed in 1862 by Fiji Island, and in 1864 by The Cook's Favorite. In 1866 Tilden appeared and then in rapid succession Maupay, Keyes's Extra Early, Boston Market, General Grant, Trophy, and Paragon.

Paragon was a marked step in advance over all former introductions. It was really the first of the round or apple shaped varieties to attain prominence, and gave a great impetus to the culture of the tomato as a field crop. It was a triumph for the application of correct principles of selection, for, in the production of this variety, the habit of a whole plant rather than the character of an individual fruit was considered.

In 1880 Perfection appeared and during the ten years following, Favorite, Beauty, Dwarf Champion, Lorillard, Ignotum, and a host of less worthy sorts have followed, until it would seem that the limit of profitable variation may have been reached.

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[1]Cf. Bailey, Bul. 31, Mich. Agr'l College, 6.

Breeding New Varieties. Is it true that the limit of improvement in the tomato has been attained? For New England I should say emphatically, No. In general the shortness of our season is such that a new and much earlier variety is needed to insure a crop before heavy frost. With this end in view we have for several years been breeding new races of tomatoes.

In 1891 crosses were made between Ignotum, one of the most valuable market varieties, and Peach, an early and productive sort which is too small and soft for general culture. Ignotum was used as the female parent. Plants resulting from these crosses were grown in the field the following year with very satisfactory results. There was a marked influence of the male parent in the character and habit of the plants, but, save in size, the fruits were not very different from Ignotum. The increase in earliness and productiveness was very marked. Whereas the average number of ripe fruits on pure Ignotum plants previous to frost was but *eighteen*, that on the crossed plants was *forty*. But, as before remarked, the size was considerably reduced.

Seeds were saved from these crossed plants and the following year a comparison was made between two generations. There was a falling off of nearly forty-four per cent in the total number of fruits borne, and of thirty-one per cent in the number ripened before frost. The past season three generations were grown side by side, with practically the same results.

A cross between Lorillard and Peach, carried along the same lines as the one just mentioned, has behaved in a very similar manner. In both cases the second and third generations showed a tendency to split up into various forms, and showed the influence of the male parent more plainly than in the first generation. In other words, although promising forms have been obtained, no type has as yet been firmly fixed.

The most interesting and important work we have done in breeding tomatoes is in connection with a true hybrid between the two species. The variety selected for the female parent was Lorillard, a well-known sort of medium size and valuable for forcing, but only moderately productive under field culture. The male parent was Currant — so far as I know the only representative of *Lycopersicum pimpinellifolium*. The hybrid is almost exactly intermediate between the two parents. The form and general texture of the foliage is suggestive of Currant, while the size

is equal to that of Lorillard. The blossoms though larger, were of the type of Currant and the fruit is borne on long racemes, very similar to those of the male parent. The individual fruits, however, were fully four times the size of Currant. The object in view in this work has been to combine the earliness and the productive qualities of Currant, with the size and vigor of the common type. To this end, crosses have been made between the hybrid already mentioned and the female parent, Lorillard, and again between this cross and the same parent. The results are in every way encouraging, but the end is not yet. The crosses still retain the distinct evidences of the influence of the original male parent, but are gradually increasing in size and now frequently show a more or less angular form, as found in the common type.

Many attempts have been made to secure a yellow tomato with a distinctly blush cheek; but as a rule no satisfactory results have been obtained. One variety has been sent out as "Lemon Blush" but in our own experience the blush has never appeared.

We have repeatedly made crosses between the red and the yellow varieties, but in every instance red fruits have resulted. At the present time, however, we have under observation a selection from Golden Queen, which is very promising. From our studies of this strain, I am convinced that the desired type may be produced more easily in a southern climate or under glass, than is possible under field culture in our latitude. The same plants produce much more highly colored fruit in February and March than in December or January, while cuttings from plants which bear well-colored fruit in the forcing-house, as a rule yield less highly colored fruit when grown in the field. It is hoped by continued care in selection to fix the type.

There is little doubt that varieties or strains, "run out," or lose their distinguishing characteristics. This variation in type may, and often does, occur very early in the life of any given variety, but with careful selection on the part of the grower, a type may be preserved for many years. It must not be understood, however, that "running out" necessarily implies deterioration, for such is not the case. A type may lose its distinguishing characteristics by reason of improvement, as well as from neglect or other causes tending to deterioration.

The Ideal Tomato.— Naturally the per cent of solid tissue in any fruit is in direct proportion to the number of cells, and in producing a new tomato, we must bear in mind a given ideal. The ideal tomato must be of medium size, firm texture, rich color, perfectly smooth, and must be early and prolific. Such a variety we have not at the present time.

My own taste would call for a fruit which is solid and "meaty" — one which contains thick cell walls, but relatively few seeds. Such a fruit was secured in the best strains of Ignotum, while that variety was in its prime. The Stone also is of this type, but neither is satisfactory in New England. The type represented by Yellow Victor, which has a hard, almost woody, core, is of course objectionable. On the other hand, some tastes demand a fruit with a large per cent of "pulp," a character found in those sorts with relatively few cells. For such tastes Chemin Market is excellent. But while it is one of the most prolific sorts we have grown under glass, this variety is so late as to be discarded for field culture.

Solidity, however, is largely an individual rather than a varietal character. As already noted, the solidity of a fruit depends on the relative number of cells or seed cavities. It should be added that a further controlling factor, is the number of seeds present. Now we know that the amount of pollen available has an important bearing on the seed production of most fruits. In other words, within certain limits, the amount of pollen received by a given flower, by determining the number of seeds produced, may to a large extent control the size, form, and relative solidity of the resulting fruit. Every grower is familiar with the small unmarketable fruits so common in the house during winter. A careful study of these fruits will reveal the fact, that most of them are nearly if not quite seedless.

Cultural Notes.— It is unnecessary at this time to go into the details of the culture of tomatoes. It may be well, however, to call attention to some of the more salient points which have received our attention during a somewhat extended study of this plant,— leaving any points of general interest to be brought out in discussion.

Our practice previous to setting plants in the field, is to sow the seed in flats about April 1, and, as soon as the plants begin to crowd, to remove them to three-inch and later to four-inch pots.

I am aware that some of the best cultivators combat the idea that frequent handling is of advantage in securing strong stocky plants, but in our own experience the practice has always been found beneficial.

Each year but strengthens our conviction that, if properly handled in the house, tomatoes may, with good results, be set in the field much earlier than is commonly supposed. The notion often expressed that the tomato is specially susceptible to a chill early in the spring, seems to be without foundation. The check frequently observed is more often due to lack of available plant food than to the "shock" of transplanting.

Trimming the plants in midsummer has usually resulted in hastening the maturity of fruit already set, and as only a relatively small portion of the crop will ripen in any case, the practice may be regarded as a good one for amateurs. It is questionable, however, whether there is sufficient advantage to warrant the practice in commercial plantations.

The old notion that tomatoes do best on relatively poor soil, was long ago exploded,[1] but comparatively little accurate work has been done toward determining the specific element or combination of elements which will produce the best results. Deductions from work conducted in Maryland[2] indicate that potash has a tendency to produce a relatively large percentage of acid in the fruit, while phosphoric acid seems to have a similar effect on the sugar content. Voorhees[3] has found that nitrate of soda, while increasing the yield, does not do so at the expense of earliness of maturity, if used in small quantities or in two or more applications; but if large quantities of nitrate were used in one application, maturity was retarded. Moreover it was concluded that nitrogen is the ruling element in the growth of the tomato, though its effect is dependent on the presence of a full supply of other elements.

In general, we may conclude that while heavy fertilizing does not lessen productiveness, the best fertilizers are those which act quickly, or hasten growth early in the season.

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[1]Cf. Bailey & Munson, Bul. 21, Cornell Expt. Sta.
[2]Patterson, Bul. 11, Md. Expt. Sta.
[3]Bul. 63, N. J. Expt. Sta.

Forcing.— The winter forcing of tomatoes is one of the most interesting and satisfactory operations of the gardener, and many have found it a profitable enterprise. The crop is one which demands care and intelligent management, but such conditions are well repaid by a ready demand for the products at high prices.

The most important conditions are: a warm, light, house — one having a two-thirds span facing the south being preferable,— strong bottom heat, rich soil, careful training, uniform temperature, care in watering and in pollinating; and above all, good judgment and constant watchfulness on the part of the grower.

Our practice may be briefly outlined: We always plan for two crops each season and as, in our northern latitudes, from four to five months are required for the tomatoes to reach maturity, we arrange that a large part of the growth of each crop shall occur without special expense for heating. The first crop is started about the first to the middle of July, and, if put on the fruiting benches in September, the crop will be in its prime in season for the holidays. The second crop is started in October, and is thus ready to take the place of the first lot, when their fruit is off in February.

When on the fruiting benches, we usually grow the plants in boxes eighteen inches square and a foot deep, four plants being placed in each box. Each plant is trained to a single stem, and thus occupies about one and one-half square feet of floor space. In training, strong flax cord, the size of wool twine or a little smaller, is used. A single strand extends from the base of each plant to the roof, and the plant is secured to the cord by bands of raffia.

Some commercial growers consider it necessary to attend to the pollination of each individual flower. Tomato flowers are highly self-fertile, however, and the only attention we have found necessary is, on bright days when the atmosphere is relatively dry, to give each plant two or three sharp taps with a padded stick.

From an extended study of the subject, I am convinced that failure to secure satisfactory results in forcing tomatoes is very commonly due to an insufficient supply of pollen. We know that when only a small amount of pollen is supplied to the stigma an undersized or irregular fruit invariably results; while, as already

suggested, the small unsalable fruits whose history has not been traced, are almost invariably seedless, or supplied with a very small number of seeds. I therefore regard some method of artificial pollination as of the greatest importance.

The varieties found most satisfactory for forcing are Lorillard, Ithaca, Chemin Market, Optimus, and Golden Queen. In our houses, for several years past the average crop from several of the leading varieties has been about 2.5 pounds per plant or 1.7 pounds per square foot of floor space. If we are sure of fifty cents per pound, the crop is a paying one.

A Brief Resumé.—The sum of the whole matter then, is this:

1. *Lycopersicum esculentum*, from which most of our common varieties of tomatoes have been developed, is a native of Peru, but is spontaneous or indigenous as far north as Texas and California, in a form closely approaching the Cherry tomato of the gardens.

2. The tomato was first cultivated in the south of Europe and is mentioned as early as 1561.

3. The fruit was used for food in 1583, but was slow in coming into general use. Seven varieties were known at the beginning of the eighteenth century, but not till a hundred years later did the culture become general in England.

4. The tomato was known and used as an article of food in this country in 1806, but was not grown for market until about 1829.

5. The modern large fruited and irregular varieties, including the French Upright, and the Grandifolium or Mikado type, have undoubtedly been developed from the Cherry tomato or a closely related form; this development has apparently come about largely by the augmentation of cells in the primitive type.

6. The results obtained from crossing the common tomato with *Lycopersicum pimpinellifolium* indicate a promising field for the development of new types.

7. Solidity of fruit is an individual, rather than a varietal, character, and this character is often dependent on the amount of pollen received by the flower.

8. If properly handled in the house, tomatoes may be set in the field much earlier than is commonly supposed, with good results.

9. Trimming plants in midsummer has usually resulted in slightly hastening the maturity of fruit already set.

10. While heavy fertilizing does not lessen productiveness, the best fertilizers are those which act quickly and hasten growth early in the season.

11. For New England the most profitable work with tomatoes may be carried on under glass. For this purpose Lorillard, Chemin, Optimus, and Golden Queen, are the most promising.

Professor Munson exhibited a variety of photographs, to show the methods of training in the forcing house, and in field culture; the effect of varying amounts of pollen on the flowers of one plant, *i. e.* where deficient; when sufficient; when excessive. Others showed the effects of different fertilizers used in both greenhouse and field; and also where different amounts per acre were used.

Discussion.

William C. Strong asked : When do you put out young tomato plants in the field, in spring? How do you avoid the killing effects of spring frosts?

Professor Munson replied that they get them out by the fifteenth of May, or as soon after as the weather will permit. The best results are always obtained from the earliest settings. If properly hardened off, tomato plants will endure a much lower temperature than is commonly supposed. One reason that young plants are so easily cut down by frost is the usual lack of vigor following transplanting. He believed that this weakness is more often due to starvation than to a sudden change of temperature. The supply of nitrogen, in a readily available form, seems insufficient for the needs of the plants. A solution of nitrate of soda — say three ounces to a gallon of water — applied at the time of setting will, by inducing vigorous growth, render the plants better able to withstand checks of any kind.

Benjamin P. Ware expressed much interest in the statement made in the lecture, regarding artificial pollination of tomato flowers, and he asked if it was necessary in field culture.

Professor Munson replied, No, the forces of Nature — wind and insects — attend to it there.

Mr. Strong asked whether tomato plants could be made to produce fruit more than one year in New England. He spoke of the tomato plant as being perennial in Southern California, he having seen plants in fruit there which were more than one year old, although not in a thrifty condition. He had lately seen, in the island of Jamaica, plantations of them producing fruit in great abundance, and in perfection throughout the winter months, especially on the southern side of the mountain range, where the soil is comparatively dry. It would seem that the fruit might be sent to our northern markets with profit, the passage by steamer being less than six days. But it is found to be very difficult to get it here in good condition. It is a fruit that does not keep or carry well.

Professor Munson said he had sometimes taken two crops of fruit from the same plant. After the first crop had been taken from a forced plant, in January, the old growth was coiled upon the top of the box of soil, in which it grew, and some fresh soil put over it. Soon after, new shoots started out, grew well, blossomed, and bore a crop of fruit — the second crop. The same result is often obtained by cutting back the old plant when the first crop is off, and allowing new shoots to grow from the eyes near the base. In practice, however, better results are obtained from the use of young plants,— either seedlings or rooted cuttings.

Mr. Strong spoke of a peculiar experience. One season he planted a large field of tomato plants. The lot was upon a side hill, and sloped to the south. In July a terrific hail storm swept over the district, causing the almost total destruction of this crop throughout that district. Singularly enough, his field, on the southerly slope of a hill, almost entirely escaped injury. From this field he sent to market a forty bushel load of fruit, which brought to him one hundred and sixty dollars. He then again referred to May planting out of tomatoes, and asked if it would be expedient to place temporary boxing around the young plants, to be covered with glass when frost was threatened.

Professor Munson had known of boxes being used as described, and the crop saved by them. But another method was to run a cultivator through all the open ground in the field, just before night; this would induce a more rapid evaporation, which would prevent frost bite.

A stranger stated that on tomato ground made rich with phosphates and other fertilizers, the fruit cracked badly.

Professor Munson had conducted some experiments with this point in view, but had observed no ill effects from heavy fertilizing. Fruits from heavily manured plats were uniformly larger and smoother than from plats less heavily fertilized. It is questionable, however, whether excessive manuring will be found profitable in commercial plantations, as the increase in yield is not sufficient to pay the increased cost of production. In some work carried on at the Cornell University a plat 30x60 feet was given nearly three tons of rich compost; while an adjacent plat, under ordinary commercial treatment was given less than one-fourth as much. The average yield per plant in the former case was but three ounces greater than in the latter.

A stranger said that some tomato plants set out early grew well and attained good size before blooming. But soon after the flowers opened they fell off. He wished to learn why they did not set fruit instead.

Professor Munson replied that not knowing the other conditions he could not explain the result.

The questioner stated his belief that tomato plants could not develop perfect flowers except when in a warm atmosphere.

Professor Munson said that oftentimes plants which have formed fruit in the house, fail to set any after being planted out. We may accept the almost universal principle, that checking plant-growth induces fruitfulness.

Another gentleman inquired whether allowing a plant to become pot-bound would promote fruitfulness.

Professor Munson said that if other conditions were favorable it would. But there is a limit to the power of good influences to secure fruitfulness; for if the other conditions are unfavorable the crop of fruit may fail.

Professor Munson, in reply to a question, said he thought one element of success in growing forced tomato plants in boxes is that the roots are thereby somewhat confined.

LECTURE AND MEETING FOR DISCUSSION.

SATURDAY, March 23, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair. The following paper was read by the author:

EDIBLE NATIVE FUNGI.

By HON. JOHN M. KINNEY, Boston.

Prejudice is stronger than reason, and it is often impossible to persuade men to do what is manifestly for their own interest, if there is any lingering memory or superstition which attaches a bad odor to the thing we want them to do. The tenacity with which we cling to prejudice is illustrated by nothing better than by the contempt and dread with which the community treats the Fungus family, condemning all varieties as unfit to eat, excepting the *Agaricus campestris* or Common Mushroom.

English and European fungi have been carefully studied and classified and their edible and poisonous qualities ascertained by a few men of science and enterprise. Badham, Berkeley, Cooke, Johnson, Smith, Bell, and Mrs. Hussey, have devoted a great deal of time to the subject, and have published books with profuse illustrations, showing to the eye by color and form what their words fail to convey. No American has, until late years, undertaken to publish any treatise on the subject. Now we have the valuable work of Capt. Julius A. Palmer, Jr., with its fine colored plates, and clear descriptions, which are full and complete, and easy to comprehend, and the United States Agricultural Reports of late years give considerable space to drawings and descriptions, showing that the people are demanding information in this regard.

There is no fruit or vegetable which, in my opinion, possesses the nutritive value of the mushroom. Badham, in his "Treatise on the Esculent Funguses of England" says (p. 136), "I have this autumn myself witnessed whole hundred-weights of rich, wholesome diet rotting under trees; woods teeming with food and not one hand to gather it; and this perhaps in the midst of potato blight, poverty and all manner of privations and public prayers against imminent famine."

It is desirable that a more general interest should be developed in the direction of knowledge of the wild mushrooms. Of course the wealthy can buy the cultivated article in the market, whilst others having the desire for this food are unable to gratify their taste in this direction, from lack of information. This information is easily attained by a little judicious application, and in a short time, exercising reasonable care, a person will be safe and make no mistakes and secure to himself a food product very nutritious and palatable. The supply is abundant. In fact "the woods are full of 'em," and within a short distance of this city, edible fungi can be found in great quantities.

The Italians are great gatherers of mushrooms and dry them for use in the winter. I had the opportunity about thirty years ago, to notice what these people were doing in this way. There was a small paper mill in Wareham, just below the Tremont station, where a number of Italians were employed. One day when driving past, I saw the hillside near the mill covered with old boards on which these people were drying mushrooms by the heat of the sun. It happened that I was at that station when these same people, late in the fall, were making their exodus to the city and they were literally loaded down with dried mushrooms in bags and bundles.

I find that the Italians at the North End are experts in the selection of wild mushrooms, as well as in the preparation of delicious dishes. I have frequently had sent to me from an Italian family, maccaroni cooked with mushrooms, which I consider excellent eating.

In the great pine forests of Plymouth and Barnstable counties, where the deer freely roam protected by law, are immense quantities of the Boletus family. With these I have become more familiar than with any other variety. Some years ago I was induced by a lady friend of mine, to collect a large quantity of these mushrooms to make into catsup, for which she had a recipe. I set boys to work, and got altogether more than two thousand pounds; but for some reason I failed to connect on the catsup, and fermentation setting in, I soon found that I had an excellent mushroom vinegar. With this as a basis, I made a superior table sauce, equal to the famous Worcestershire; indeed, by many people it was considered better, as it had a delicate mushroom flavor, not apparent in the other. Many other varieties

of edible fungi were found in this locality, but I am not so well acquainted with them.

It is an accepted fact that some of the mushroom types are poisonous, whilst others are edible; but the problem to be solved is, which are good and which are bad. It must be understood at the outset, that there are no general rules, capable of universal application, whereby the edible fungi may be at once distinguished from the poisonous. Our task would be an easy one, if such a royal road could be discovered. But unfortunately, every effort to apply general rules has failed, and no possible course remains but to become acquainted with every individual species which we resolve to eat, and at the same time with those we should specially avoid. Therefore it may be proper to remark that there are some features manifested in connection with poisonous or disagreeable fungi, which should be borne in mind, as tending to diminish labor in investigation. For instance it may be concluded that fungi which possess a distinctly disagreeable odor may be discarded at once, as unwholesome. Then again, any kinds, the flesh of which when cut or bruised shows a change of color, especially to a *dark* blue, should be avoided. Even the common mushroom will turn brown when cut, and some of the other edible species, will show a slight change; but it is the immediate and rapid change to a deep blue, which should be accepted as a danger signal. It may be safely understood that any species of which a small fragment when eaten raw is biting or unpleasant, is not worthy of experiment. Another precaution may be added, that such fungi as contain a milky juice which exudes freely on being cut or wounded should not be eaten, without careful determination. Once for all, it must he insisted on that, in order to avoid danger, no fungi should be eaten at random, and only those which after careful examination are found to agree with both figure and description (unless practically well-known) should ever be prepared for the table. No method is so safe as that which consists in mastering the characteristics of a few species, especially when pointed out by one who is practically conversant with them. and increasing the number by experience. There are certainly a great many common species to be found in this country which may be eaten with safety, but if only ten or twelve of these are well known, they will furnish all the variety which an ordinary person will require. Experiments in eating unknown

fungi or those concerning which any doubt exists, should on no account be encouraged. We may not possess so many truly poisonous species as has been supposed, but that we do possess some is an undoubted fact; and it should be remembered as a caution. Thoroughly experienced fungus-eaters seldom experiment on unknown species, but only upon those which are known to be harmless, or which by their natural affinities afford no possible reason for doubt.

Characteristic and accurate figures are a great help in the determination of species, but figures alone are scarcely sufficient for the inexperienced, and should always be supplemented by a reference to the written description. Features of importance may be overlooked in scanning a figure, but these may be emphasized in the description. Moreover there are features which cannot be represented in diagrams, which may nevertheless be very evident in the fungus itself, such as viscidity, odor, and taste.

It is a popular error that a mushroom may be distinguished from a toadstool by the cuticle of the cap. Some persons hold that if the cuticle or skin of the cap (or pileus) can be stripped off readily, then the fungus in question is an edible mushroom; but if it cannot be stripped off, it is poisonous. The cuticle is certainly separable in the mushroom, both wild and cultivated; but in numerous instances it is separable in other species that are certainly dangerous; whereas in some excellent species which are constantly eaten, there is no separable cuticle. I was advised by Capt. Palmer, (a high authority on fungi, whose book on American fungi I have already mentioned), when in doubt as to the safety of any species, to eat a small piece, and the next day to try a larger piece; if no unpleasant results occurred it might be considered edible. I would advise all persons who have an interest in this subject to study his works.

The assumption that fungi of the same species growing in different localities, may be so modified by circumstances as to lose or acquire poisonous qualities, has not been established. One of our most virulent species has undoubtedly been eaten in Russia with no disagreeable results, but there is no evidence that the character of the fungus had changed, whilst there is every reason to believe that the process of cooking adopted was calculated to produce such results. It is very probable that the poisonous principle existing in any fungus as it is grown, may be

neutralized by the use of acids or alkalies. Fungi of the mushroom type grow rapidly, and rapidly decay. Chemical changes take place so readily that it is important that this class of food should be cooked as speedily as possible after it is gathered, before any appreciable change takes place. It is by no means certain that stale mushrooms are innocuous, and in some cases where mushrooms have been accused of producing unpleasant effects in persons of delicate constitutions, it is possible that the cause was not in the mushrooms originally, but was developed by incipient decay.

We would dispel the illusion that the common mushroom is the type to which all edible fungi must conform, and that all others should be compared with it. There are some which have the same flavor, or one closely resembling it, whilst there are others of a totally different kind. Much disappointment is liable to follow if, in all cases, it is expected to meet with the mushroom in some modified form. There is as much difference in the peculiar flavor of different species as there is in the different kinds of flesh. No one would be satisfied if veal tasted like mutton, or roast pork like roast beef; and there is just as much difference in the taste of the edible fungi. In some the taste is perfectly novel, and produces a new sensation; for instance, there is not the least resemblance between the Puffball and the ordinary mushroom. It is in this great variety that much of the charm lies; otherwise it would be better to adhere to the common mushroom than to venture upon others which would be no better than substitutes. In tasting of a new dish, therefore, it is better to forget the old one for the time, and expect to partake of something which has to rest on its own merits, and not on its resemblance to anything else.

As a natural consequence of this variety of flavor, it is essential that each species should be used by itself, and that two or more kinds should not be mixed together, in a sort of hotch-potch, where no particular flavor prevails, but all are reduced to a horrible mediocrity. A professed fungus-eater would no more think of sitting down to a dish composed indiscriminately of half a dozen species, than would a gourmet of mixing his wines, or combining his venison with his salmon and turkey. Much of the excellence of a dish of fungi depends upon the cook, for a bad cook will spoil the best dish that was ever invented. It is no part

of our present design to give special instructions in the art of cooking mushrooms, for there is an art in it which makes all the difference. Frankly, the ordinary domestic cook, without experience, never succeeds well, even with the common mushroom; it requires a kitchen genius to present them at their best. It has been said that "Mushrooms are the gift of Nature, whilst a good cook is the gift of God."

The edible qualities of various Agarics are well known to the common people on the continent of Europe. They eat them freely, and make money by their sale, whilst in Great Britain, scientific men have ventured to a large extent to explore the field and forest in search of additions to the table list. On the continent, eaten fresh, dried, preserved in oil or vinegar or salt, fungi constitute, for weeks together, the food of many people; and in Rome there is an inspector of fungi, who daily examines the supplies which come in from the country, and condemns all that are unsound or unsafe to be thrown away. Curiously enough, the law points out by name our favorite *Agaricus campestris*, as poisonous, and orders it to be thrown into the Tiber. Here again the question of locality occurs, suggesting that climatic, or some other unknown cause, may make a radical change in the fungi, as in the case before mentioned, in which a variety whose poisonous quality here is well settled, is eaten with impunity in Russia, and this opens up a wide field for scientific investigation.

It is commonly supposed that fungi are the consequence of decay, and we do find the greatest number of them on decaying substances; but we find them also on glass, flints, metals, in poisonous solutions, and in pure and undecomposed water.

An instance is given of a blacksmith who threw aside a piece of iron at night, fresh forged, and in the morning found it covered with an Ethalium two feet in length. Gun-barrels and sword-scabbards left in damp, close rooms have been covered with a blue mould in a few days. The rapidity with which many if not all fungi grow baffles calculation; the great Puffball, *Lycoperdon giganteum* will grow as large as a peck measure in forty-eight hours, and specimens of *Agaricus campestris* have developed from the button (which is a bud the size of a pea), to a mushroom as large as a coffee saucer, in a night; but it must not be supposed that all this increase of size in a single night is actual growth. Agarics are many weeks forming under the surface of the ground;

their cells are small and closely packed, and ready to expand when the moisture and heat are favorable. When the auspicious moment arrives, the cells absorb abundant moisture and, stimulated by heat, swell out to their full size.

"Any vegetable productions which can increase so fast and are so omnipresent are worth studying to find out their good and bad qualities; and it is probable that among the poisonous fungi, there are many which are as valuable to the pharmacopœia as others are to the table." This statement, written more than twenty years ago by the late R. Morris Copeland, has been verified by the use of Muscarina. This remedy is an "active toxic alkaloid of syrupy consistence, from *Agaricus muscarius*, or *Amanita muscaria*, or fly agaric, a poisonous mushroom, used in Kamschatka as an intoxicant. The alkaloid is freely dissolved out by water and dilute acetic acid." A full description of the physiological effects can be found in Pattee's "Compend of Materia Medica." The poisonous effects manifest themselves very soon after eating, causing heat and a prickling sensation in the fauces of the throat, with burning, and severe sickness at the stomach. In light cases the sickness is relieved by vomiting before any serious injury is done, but at other times the victim is sick for many days, and occasionally death ensues. In the intoxication produced by the *Amanita muscaria*, ludicrous effects are produced; a talkative person cannot keep silence or secrets; one fond of music is perpetually singing, and if a person under its influence wishes to step across a straw or small stick, he takes strides or jumps sufficiently long and high to clear the trunk of a tree.

The juice of *Agaricus muscarius* will kill flies; the fumes of dried puffball when burned will stupify bees and small animals; even the spores of *Agaricus vellereus* made one experimenter very sick; a few grains of *Amanita verna* will kill a dog. *Russula emetica*, as its name shows, is a violent emetic, and a larger dose will kill.

With so much that is dangerous, there is little real risk attendant on the use of the varied forms of fungi, for they can be easily classified, and are quite distinct in their appearance and effects. There are simple rules which, carefully applied, greatly reduce the chances of mistake, and simplify choice. Any fungus which has a disagreeable smell should be avoided; for, although there are a few bad smelling ones that are good kinds, they are very rare.

It may be asked, what is a bad smelling fungus? It may be answered more easily by saying that a mushroom has a good smell; it has a decidedly earthy or fresh odor, reminding one of cool shady nooks in the forest, amongst the ferns and lichens. To describe the odor in words would be impossible. Find a good mushroom and smell of it, and the standard will be always established. Every good fungus will smell like a mushroom, though often with a difference, but no one will ever call the odor unpleasant or impure. Bad kinds will have a peculiar sharpness in their woody smell, or a dirty smell like decaying flesh, and some are so bad smelling that their presence cannot be endured in a room. If the odor of a fungus is satisfactory look at its color. Nearly all the edible fungi are pleasant colored — white, with delicate tints of rose; light shades of yellow and orange; light brown and gray; but the majority are white, pink, orange, or drab. I have a theory that soon the poisonous alkaloid will be eliminated or neutralized from the dangerous species, so that all mushrooms may be rendered edible and useful, and all risk removed. This opens up a wide field for chemical investigation, and I trust that some chemist may be found competent.

I have not attempted to give a list of the numerous varieties, as this can be much better done by the study of some standard work on American fungi, with illustrations and descriptions, and I would specially recommend the works of Capt. Palmer, for this purpose.

I have endeavored to collect some points of interest to bring to your notice, and hope I have aroused a little more interest in our native edible fungi.

Discussion.

Rev. Calvin Terry said that it appears that there is danger of serious illness, and possible death, if one indulges in this kind of food without some knowledge by which to make a proper selection. We have but one life and it behooves us to get the necessary information before we begin to use anything that is new and strange to us. We need to learn what color distinguishes the wholesome varieties, what peculiar forms are to be selected, and what localities are to be visited to find this delicious food material.

Mr. Kinney said that color is not a sure indication of wholesomeness. The only sure way to learn how to distinguish the edible varieties is to get a book containing full and clear descriptions of this class, with accurately drawn and correctly colored illustrations. Take the book with you into the field, meadow, or woodland, and, having found a living specimen, carefully examine it in all its parts, and having found in your book a picture resembling it, compare the two critically, and see if the description also in the book is applicable to the plant in hand in all respects; but bear in mind that the appearance of the living plant changes as the days of its brief existence go by, and that when it has passed a certain stage decay begins and poisonous qualities are developed. The common mushroom (*Agaricus campestris*), when ready for use as food, has pink gills, which later become brown and finally black.

Miss Jones said she had seen, in a French book, a statement of what was claimed to be an infallible rule, that if the juice of any mushroom would not quickly discolor a bright silver surface, it was a safe one to use as food.

Mr. Terry suggested that it might be true that there is a difference in the constitution of individuals which allows some persons to eat freely, with safety, of certain vegetables or other foods which are poisonous to others.

Professor George F. H. Markoe said many important discoveries had been made in toxicology; one of which was that all decomposing organic matter develops poisonous alkaloids called ptomaines. In the decay of milk, a peculiar ptomaine is developed and this poison is always the cause of cholera infantum. Every one should be very careful how he or she uses any food which is in a state of decay. In selecting mushrooms for table use, one can safely adopt this rule: every *good* mushroom has a pleasing odor and an agreeable taste. The speaker said that he would be perfectly willing to eat any unknown mushroom, which had no offensive odor, nor an acrid, bitter, or otherwise disagreeable taste.

Mr. Kinney approved Professor Markoe's statements respecting the characteristics of good mushrooms.

Professor Markoe added that we obtain many valuable substances from poisonous plants. The so-called Poison Hemlock (*Conium maculatum*) yields, from leaves and seeds, a narcotic poison which is much used as a sedative and antispasimodc

medicine; and our well-known Tapioca is prepared from the roots or tubers of the Cassava plant *(Jatropha manihot)* although the sap of the plant contains hydrocyanic acid. But in the preparation of tapioca, the heat employed expels the poisonous element. It is a curious fact, that, in Russia, the above mentioned poison hemlock, is eaten with impunity by sheep and goats.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, March 30, 1895.

A Meeting for Lecture and Discussion was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

COMMERCIAL FERTILIZERS IN HORTICULTURE.

By Professor W. H. JORDAN, Director of the Maine State College Agricultural Experiment Station.

Statistics tell us that in 1892 the farmers of the United States purchased 1,500,000 tons of commercial fertilizers at a total cost of $53,000,000. It goes without saying then, that my subject today is an important one. It is also a difficult one. I am often moved to declare, at those times when my thought is concentrated upon its complexities and ramifications, that it is, all things considered, the most unsatisfactory of themes for discussion before a body of practical men.

A very large percentage of the inquiries that come to me as a Station Director, pertain to commercial fertilizers, and to some of these questions I can give immediate and definite replies. But when some farmer interrogates me after this fashion: "What is the best commercial fertilizer sold in the state?" or "What fertilizer should I purchase to use in growing potatoes?" or "Do you regard John Doe's Potato Fertilizer as preferable to James Roe's Potato Manure?" both my regard for the ofttimes sensitive feelings of the fertilizer manufacturer, and my pride in my reputation as one who would like to be called a sound adviser, lead me to return evasive or very general replies. Definite and unmodified replies would be injurious both to my reputation and to the best welfare of the inquirer. Before you today, then, you may expect me to treat this subject in a somewhat general manner.

Two facts handicap a discussion of certain special questions that relate to this subject as viewed from the standpoint of the horticulturist.

First. There is a dearth of exact knowledge that can be universally applied to the use of commercial fertilizers. We have many theories, opinions, and think so's, but altogether too few demonstrations.

Second. There is a perplexing complexity and variation of conditions under which different men are working.

When I first began to cast about in my mind for the lines of thought which I would discuss here today, these two topics at once presented themselves:

First. Fertilizers that we may safely regard as "specifics" for particular crops.

Second. The composition of fertilizers in its relation to the quality of the product.

These two topics are today in the forefront of active thought pertaining to plant nutrition, and it would give me great pleasure at this time to incorporate into a creed of practice well demonstrated facts bearing upon these important considerations. When, however, I came to turn over the records of experimental work upon the relation of different compounds and mixtures of compounds to the development and quality of vegetables and fruits, I found such an absence of data, such conflicting testimony, and, in general, such an unsatisfactory condition of statement, that a decision was at once reached that I would not come here and talk about hypotheses or half-demonstrated theories. There are, however, certain general remarks that with your indulgence I will make in this connection.

In the first place, I am somewhat skeptical in the matter of "specifics" in plant nutrition, at least so far as quantity of product is concerned. It is true that the needs of all plants for food are not just the same, because both the relative and absolute quantities of ingredients that they take up differ, and because some plants thrive with a food supply to which others are more or less indifferent. If by "specific" manuring we mean the supplying of a particular plant with its needed food elements in acceptable forms, so that it will make rapid and generous growth, I have no exception to take to the term, but I hold that the "*needed food elements*" and the "*acceptable forms*" are too

nearly the same for a large proportion of the crops that enter into intensive agriculture to allow any very narrow use of the term specific.

The specific thing to do is to feed the plant generously with what it needs.

I can illustrate my thought no better perhaps, than by referring to the experiments from the results of which the public, at least, has come to believe that nitrate of soda is a specific for tomatoes. These experiments were conducted mostly at the New Jersey and New York (Cornell) Experiment Stations, and upon consulting the conclusions drawn by the experimenters, I find that while nitrate of soda has in some cases a greater influence when used alone than any other single fertilizer, such statements as these are made: First. "Neither nitrate of soda nor muriate of potash alone are profitable tomato manures upon thin soil." (Cornell Bul. 21.) Second. "That the best effect is secured from manuring with nitrate of soda when there is in the soil a sufficiency of the mineral elements phosphoric acid and potash. (N. J. Bul. 63.)" Third. "These conclusions . . . show that *financial profits* from the use of nitrate of soda are also governed by the *quantity applied*, the *method of application* and a *full supply in the soil of the mineral elements*. (N. J. Bul. 79)." What other meaning can be given to these conclusions than this,— that when tomatoes are abundantly supplied with all other elements of growth save nitrogen, the addition of nitrate of soda, containing nitrogen combined as nitric acid (all things considered its most efficient form), greatly promotes growth and vigor. Of very many, if not nearly all, of our cultivated plants, can the same thing be said. Nitrate of soda is a great and almost universal specific for furnishing available nitrogen to crops, as a wide experience shows. That it is peculiarly so for tomatoes or any other small list of cultivated plants I seriously question.

My point is this: Cultivated plants require the same elements of plant food, though in somewhat variable proportions. These elements are found in certain compounds which are very generally useful in plant nutrition. When a crop grower uses one or more of these compounds to supplement his otherwise available supply of plant food so as to secure intensive growth, that compound is for him a "specific" for his conditions.

Turning now, in the second place, to the influence of the composition of the fertilizer upon the product, we enter a field of far too scanty knowledge, and in regard to the information which we have, I freely confess that to me it does not have a desirable definiteness and conclusiveness. Nor is this strange. Quality in vegetables and fruits is dependent upon so many conditions, such as climate, season, the fertility of the soil, rapidity of growth, and manner of handling, that it is difficult to trace the relation between a single cause and its effect. There appears to be no theoretical reason why a vegetable or a fruit may not be materially modified by varying the kind and quantity of its food supply, and, indeed, there are well established examples of this nature. The increased ash content of plants through a liberal supply of easily available mineral food; the greater albuminoid content in certain grasses due to heavy feeding with soluble nitrogen salts; the effect, in certain instances at least, of potassium chloride upon the starch content of the potato; the influence of the proportion of nitrogen to phosphoric acid and potash compounds in fertilizers upon the sugar content of beets; the deterioration of the burning quality of the tobacco leaf because of the influence of muriate of potash in the fertilizer,— are all instances, well enough proven, of favorable or unfavorable results from the manner of feeding the plant. It is entirely reasonable to suppose that the sweetness or acidity of fruits, or the flavor of certain vegetables, may be modified in ways we do not now understand, by the kind and quality of food supplied. Here is a field for continued and painstaking work on the part of investigators in experiment stations.

It appears to me quite certain, however, that much of the influence supposed to be due to the fertilizer is of an indirect rather than a direct nature. I regard the sugar beet as an illustration of this. It does not appear that the depression of the per cent of sugar caused by heavy applications of animal manures, or by an excessive use of nitrogen salts, is due to a direct antagonism of the nitrogen compounds to sugar formation, but rather to the fact that the abundant supply of nitrogenous compounds so intensifies and prolongs the growth of the beets as to prevent the production of the large sugar content which occurs at maturity. So with other vegetables, the rate of growth and the degree of maturity within a given time are important in rela-

tion to quality, and these conditions are controlled in part by the fertilizer used.

But I feel quite sure that what I have said so far you would characterize as consisting of somewhat broad generalizations, so indefinite as to be devoid of much in the way of practical suggestions. Let us, therefore, turn to a side of our subject, which admits of discussion on a safe and well established basis. And I notice, first of all, that stable manure is the main reliance with the horticulturist, especially in forcing house and market garden work. This will doubtless always be the case for several reasons.

First. The organic matter of these manures gives a physical condition which, in its relations to heat and moisture is more favorable to plant growth than can be obtained in any other way.

Second. Such manures cause a soil to become a hotbed of chemical activity.

Third. Animal manures, generally speaking, are a fairly complete and well balanced source of plant food.

We may safely assume then that, in vegetable growing at least, commercial fertilizers will be used principally as a supplement to stable manure. It is with this fact in mind, then, that we will continue our discussion of this subject.

We are now considering commercial plant food,— that which must be purchased,— the nitrogen of which will cost upwards of twenty cents per pound, the available phosphoric acid, seven cents, and the potash five to six cents, when landed where they are to be used. How shall this plant food be purchased, and in what forms? Are the ordinary superphosphates, or even the so-called special manures in the markets, a desirable source of plant food for the horticulturist?

And I remark as a general proposition that the agriculturist, and the horticulturist in particular, can do better than to depend upon the ordinary brands of superphosphates or mixed fertilizers, as at present manufactured, for his commercial supply of plant food. This statement is not offered as a general criticism upon fertilizer manufacturers or upon their goods. While I am not satisfied with the existing conditions of our fertilizer trade in its relation to any class of crop producers, there is no element of blame attaching to either the honorable manufacturer or the farmer. They are both very much the victims of circumstances. The trade has grown into its present means and methods

gradually, molded by competition, the necessity for profit, the relative cheapness of materials, conditions of intelligence or ignorance upon the part of consumers, and, to some extent, by prevailing notions in the scientific world.

Unfortunately, however, (and I say this out of a dozen or more years of experience as an inspector of fertilizers) it is the minority of fertilizer manufacturers who are making a study of the real needs of agriculture so as to meet these needs with the right amount of the best materials. Too many of them are dealing upon the ephemeral basis of selling the least value in plant food, for the biggest price that competition will allow, rather than upon the more enduring foundation of supplying the most useful compounds for plant nutrition in the right proportions. The methods that govern the patent medicine trade have entered too largely into the fertilizer trade. It is too often a matter of skillful advertising, or the canvassing of a shrewd, tonguey agent, rather than a consideration of the real needs of the consumer. The horticulturist, at least, should stand outside these unfortunate conditions, for he, as a rule, is a man who is intelligently studying his business.

In order to get at this matter more in detail, let us consider briefly what fertilizers are and the sources of the materials that enter into them.

The superphosphates of the trade are, as you well know, mostly mixtures, in varying proportions, of three classes of compounds, — those containing nitrogen, phosphates of various kinds, and potash salts. The leading ingredient in the matter of quantity is phosphoric acid, potash standing next in order.

The principal sources of phosphoric acid are bone in its various forms,— raw, steamed, dissolved bone and dissolved bone black, South Carolina and Florida rock phosphates both crude and dissolved, phosphatic guanos, etc. In all these substances the phosphoric acid is combined chiefly with calcium oxide or lime, although one material which is made up mostly of phosphates of iron and aluminum has recently come into some prominence. The availability of phosphoric acid in these several sources of supply is the main point for consideration, and I have this to say, that in so far as it is rendered water-soluble its value is uniform whatever its source. The so-called "reverted" or "citrate soluble" phosphoric acid must also have a practically uniform

value when it consists of phosphate of lime that is truly "reverted," but there are other compounds which are dissolved by ammonium citrate to which the term available should, in my judgment, be applied with caution. Let me explain.

We have recently erected at the Maine Experiment Station a forcing house for the study of certain problems in plant nutrition. For two years we have been investigating the foraging power of a variety of plants for phosphoric acid as obtained from different sources, and among other materials entering into our work is one somewhat peculiar. It is made up of phosphates of iron and aluminum, which in their natural condition were hydrates and insoluble in the citrate solution, but which by the application of heat are rendered anhydrous and soluble in ammonium citrate, though not in water. In the parlance of fertilizer analysis this phosphoric acid is therefore styled reverted and available. The fact is, however (and this is a sad comment on the citrate method for determining the real availability of phosphoric acid), the phosphoric acid in this form does not prove to be highly available, at least under the conditions of our experiments, except in the case of turnips. In our experiments clover, peas, barley, corn, potatoes and tomatoes have not been able, under forcing house conditions, to feed from it readily, whereas, in the case of the clover and peas at least, floats from Florida rock, very little of the phosphoric acid of which is dissolved in the citrate solution, have proven more useful.

The important point in this connection is this: these anhydrous phosphates of iron and aluminum are being used to increase the per cent of so-called available phosphoric acid in some of our mixed fertilizers. To this fact in its relation to the forcing house and the market garden, I shall refer later.

The potash salts imported from Germany are the almost exclusive source of potash in our mixed fertilizers. We have three of these compounds, the chloride or muriate, the sulphate, and lately the carbonate, all of which are soluble in water, and which, for general agricultural uses, we may regard as practically equal in value, and probably so for the special uses of the horticulturist. Commercially the sulphate is more valuable than the muriate.

The commercial sources of nitrogen are greater in number and more varied in character than is the case with either phosphoric acid or potash. No plant-food problem, either commercially or

in practice, demands more careful consideration than does the nitrogen supply.

First. The element is expensive, for it costs nearly three times what the other two do.

Second. It is subject to greater possibilities of waste than any other commercial element of plant food.

Third. It may be, and is, derived in part from inferior sources.

The third and last statement is the one with which we are mainly concerned in today's discussion.

The nitrogen of fertilizers is found to be combined in three general forms, viz.: in nitric acid or nitrates, in ammonia or ammonium salts, and in vegetable and animal substances, which as a class are called organic ammoniates. The only representative of the first class, which enters into the fertilizer trade is nitrate of soda. In this we have the nitrogen as nitric acid, the form adapted *par excellence* for the uses of the plant. We have reason to believe that nitrogen enters the plant largely in this combination, and that other forms are to a great extent changed to this before becoming useful.

Standing next to nitrates in point of value, and perhaps scarcely below, are the ammonium compounds, sulphate of ammonia being the only one entering into the list of fertilizer supplies. This is the most concentrated nitrogenous fertilizer we have, and even though its nitrogen may suffer conversion into nitric acid wholly or in part before being utilized, it takes a place second to nitrate of soda, if at all, only upon theoretical grounds, for in practice it is found to act with entire promptness and efficiency in promoting growth.

When now we come to a consideration of the organic ammoniates actually found in the markets, it is not possible to speak of them all in terms of approval. A fairly complete list of these ammoniates are the following: Dried blood, dried meat, tankage (which may be varied in character and may cover a multitude of sins), ground bone, dried fish, fish scrap, hoof and horn meal, waste hair, waste meal, leather, cotton seed meal, and castor pomace.

These materials are classified as to agricultural value according to their availability, or the readiness with which the nitrogen is carried over (through processes of fermentation and decay) into compounds which the plant can utilize. Judging from this standpoint those organic ammoniates which should be ranked as

desirable are dried blood, dried meat, tankage (consisting of meat and bone), dried fish, cotton seed meal, and castor pomace. I am not ready to place hoof and horn meal in the afore mentioned list, neither shall I include it with certain kinds of tankage, wool waste, hair waste, and leather, which are inferior and should be regarded as frauds in any fertilizer that is put forward for one of good quality.

But you ask, Are these inferior ammoniates, these frauds, actually used in the manufacture of fertilizers? There is credible evidence that they are. Some one now inquires, Are they found in the fertilizers which I buy? That depends. Unquestionably they are bought by somebody, otherwise they would not be manufactured, but whether you buy them or not I am not able to say. Unfortunately if you were to put a sample of the fertilizer you have purchased into the hands of the chemist, he could not answer your question with any degree of certainty.

Doubtless these statements will be regarded as a serious indictment of the fertilizer trade. I do not mean to imply, however, that all brands of fertilizer contain these inferior materials, or to disguise the fact that a vast amount of the best of organic material is mixed into the various brands of superphosphates. I do mean to call attention, though, to the possibilities of purchasing nitrogen unfit for the uses of the horticulturist who is seeking rapid growth and quick returns. Whatever may be said of grass and grain farming, the forcing house and market garden are no place for compounds so inert that they must undergo a long process of "weathering" before becoming useful, and whose purchase in the place of better materials may cause the partial loss of a season's opportunity. The producer of fine vegetables for the city market needs his plant food in forms easily available at once, especially that part of it which he purchases as a supplement to stable manure in order to secure the earliest possible growth.

It is very easy for us to perceive, in the light of these facts, that it is very important, for the horticulturist especially, to adopt such methods of dealing as shall insure the purchase of the right kind of plant food. What shall these methods be? While affirming that the advertised brands of fertilizers furnish, in a certain percentage of cases, which may be greater or less, plant food of the very best quality, I will offer for your consideration two

methods, the adoption of either of which would in my judgment constitute a progressive step.

First. Home mixing of chemicals.

Second. An order to a manufacturer in whom you have entire confidence, for a mixture of chemicals which you shall specify. Either of these methods gives an opportunity to select materials, the quality of which is known, with a good degree of assurance. Nitrate of soda and sulphate of ammonia may be adulterated, but when taken in an unmixed condition, the value and extent of the adulterations are easily detected. Dried blood and dried and ground meat, each possesses a somewhat characteristic appearance, an important variation from which attracts attention. Tankage, to be sure, may, if purchased, still give an opportunity for deception, but if it can be inspected as such, the presence of wool and hair waste and leather are much more easily discovered, than when mixed with the larger bulk of phosphatic and potash materials, associated with it in mixed fertilizers.

The nature of phosphoric acid compounds may also be known when purchased as a plain superphosphate. Dissolved bone black and acid phosphates are easily recognizable by their physical appearance, but if not, chemistry is perfectly competent to determine whether they contain any compounds of questionable value. In fact, when a plain superphosphate is bought on a guarantee there is very little reason to expect any deception as to the amount and quality of the phosphoric acid obtained. Certainly in this way it is possible to avoid the unwitting use of these phosphates of iron and alumina of which I have made previous mention, and which we must now regard as undesirable for use in forcing the growth of vegetables.

I urge upon the horticulturist then, some method of buying his plant food that will allow him to select it with reference to its quality. Why shall he not do this? The dairyman is very particular about the quality of his animal foods, and why should not the plant feeder be equally careful. Fertilizers cost more per ton than bran or meal, and a season's opportunity in vegetable production is worth as much as cows, milk, and butter. You cannot deceive the plant any more than you can the cow. The cow and plant alike refuse to yield generous returns without proper nourishment, and so I am unable to understand why plant food should not be obtained in ways that admit of the same close inspection of materials as is the case in the cattle food trade.

There is another reason why I would not buy the ordinary brands of superphosphates, as a supply of plant food for the forcing house and market garden, viz.: The three ingredients, nitrogen, phosphoric acid, and potash are not combined in the right proportion for use under these conditions. Not long ago I took occasion to ascertain the proportion of nitrogen to available phosphoric acid and potash soluble in water in fifty-eight brands of fertilizers sold in Maine. I found that for each 100 pounds of nitrogen these goods contained on the average 460 pounds of available phosphoric acid and 120 pounds of potash. These proportions are very different from those existing in the quick growing food plants most common to horticulture. I find that the average proportions in twelve of the most important vegetables is, nitrogen 100, phosphoric acid 50, and potash 160. This shows that in the average fertilizer the ratio of phosphoric acid to nitrogen is nine times greater than it is in the average of twelve vegetables. The ratio existing between the nitrogen and potash is not greatly different in the two cases. This means then, that if the fertilizer is to correspond to what the plant uses it must be compounded quite differently from the average formula found in the market: in no case, out of the fifty-eight fertilizers examined, did I find a ratio of nitrogen to phosphoric acid greater than one to two, which would give a proportion four times less than in the crops distinctively horticultural.

But should a fertilizer contain the elements of plant food in the same relative proportions that they are found in the plant? Perhaps never just the same — perhaps sometimes very widely different — but the degree of approximation to this must depend upon circumstances. It is true in the abstract that a crop grower purchases plant food most wisely when he buys just enough of certain ingredients to make good the deficiencies of his home resources. What those deficiencies are is determined by several factors, the important ones being the soil, the crops grown in the rotation, and the kind and quantity of products sold. I would never advise the general farmer to adopt as a principle of action special fertilizers whose formulas are based wholly upon the composition of the crops he is to produce, for to do this is to ignore the greatly varying capacities of soils, the unlike feeding power of different plants, the use of legumes as a source of nitrogen supply,—is to ignore, indeed, all but one of those factors

which determine the farmer's plant food deficiencies. For certain farmers in the Connecticut Valley, whose alluvial soils cry out for potash, to buy the same fixed formula as the Maine farmer, whose granitic soil is, by the processes of weathering, yielding its annual quota of available potash, or for the grain producer, whose environment admits of the successful use of clover in the rotation, to purchase as much nitrogen as the farmer located where clover does not thrive, is to adopt a "rule of thumb" method that does not belong to the highest order of farm management. I grant, yes, I do more than this, I assert, that with the horticulturist, who is engaged in intensive production, the case is different. In the forcing house and garden, conditions are almost if not entirely artificial, so far as it is a question of feeding the plant. Even in the garden, the variations in the natural food supply are obscured by the greater amount of available material supplied by the generous applications of stable and commercial manures. While we must still depend to an extent upon the chemical activities whose field of action is the rich garden loam and the artificial soil of the forcing house, we are comparatively independent of those processes of weathering which are of so much importance as a means of fertility in the long rotations of the grass and grain farm. In the production of grass, grain, and even the ordinary hoed crops, the natural capacity of the soil, or its annual contribution of available plant food is an important, and even a controlling, factor; but in certain lines of horticultural work it is a minor factor. In horticulture and the forcing of vegetables, the plant is the one thing to be considered, and after we have made the physical conditions and water supply what they should be, we may safely proceed to feed the plant as if its sole supply of nourishment is what we furnish it.

The considerations stated in the foregoing lead me to the conviction then that the fertilizers ordinarily found in the markets are not economically adapted to certain lines of horticultural work. The proportions of ingredients in these goods is such that it is necessary to purchase too much of one in order to obtain enough of others. For use under the conditions to which I have so far confined this discussion, I am convinced that on the average the amount of phosphoric acid used should at least not be in excess of either the nitrogen or potash, or, in other words, for market garden and forcing house use, the proportions of

nitrogen and potash should be greater than is found in the established brands of mixed fertilizers now offered in the market.

This desirable change can be secured, as I have already indicated, by the purchase of chemicals to be mixed at home, or by coöperating with some manufacturer in whom you have confidence. Under right conditions either method may be successful. It would be foolish to ignore the manufacturer, because the wisdom of a division of labor holds good here as elsewhere. But we should keep him in his place, which is to supply us with what we wish to purchase, without even supposing that he can determine our needs. These we must discover for ourselves, aided by the investigations and results of others. There has been too much of a feeling on the part of the agricultural public, that somehow or other the manufacturer is able to discern the needs of farmers, because of a higher range of knowledge to which he has access; that somehow or other the same knowledge enables him so to conjure with materials obtained from unusual sources that he is bound to offer, if not the right thing, a very good thing, which rises above the common everyday facts and means of agricultural practice.

The crop grower should never forget that the manufacturer is studying commercial opportunities chiefly, and that he is first of all a business man, and is rarely competent either from the practical or scientific standpoint to guide in the practice of plant feeding. His province is to study the markets and processes of manufacture, and in these directions he must lead; but in respect to the use of plant food the farmer should lead, and the manufacturer should buy and manipulate to suit the demand that comes up to him from the consumer.

Commercial fertilizers, as they exist in the markets today, are a curious medley. In their composition the fact is recognized that nitrogen, phosphoric acid, and potash, are the three constituents of plant food, one or more of which is likely to be needed to increase fertility; but beyond this they fail in most instances to embody any distinct principle or rule of practice. The so-called special manures of different manufactures, designed for the same crop, differ almost as widely as do the brands designed for general use. Order will sometime come out of this chaos, but chiefly through the efforts of those who use the various preparations of plant food. This will not be done, however, until trade names pass

into "innocuous desuetude," and plant food in its various forms, is both bought and sold by the names it properly bears, as one buys and sells sugar, iron, or any other standard commodity. And the time is coming when the general farmer, or the market gardener, will order of the dealer so many pounds each of nitrogen, phosphoric acid, and potash, just as now he purchases seeds and foods.

As a suggestion to those, especially market gardeners and those managing forcing houses, who are inclined to mix their own fertilizers or to ask for a definite mixture from the dealer, I offer the following combinations, which may be varied *ad libitum*.

(1)

Nitrate of soda	15 per cent	nitrogen	350 lbs.
Dried Blood	10 "	"	700 "
	2 "	phosphoric acid	
Acid Phosphate	15 "	" "	700 "
Sulphate of Potash	50 "	potash	250 "

This combination would contain the following:

Nitrogen	122 lbs.	or 6.1 per cent.
Phosphoric acid	119 "	" 5.9 "
Potash	125 "	" 6.2 "

(2)

Sulphate of Ammonia	20 per cent	nitrogen	250 lbs.
Cotton seed meal	6.75 "	"	1000 "
	2.75 "	phosphoric acid	
	1.75 "	potash	
Acid Phosphate	15 "	phosphoric acid	550 "
Muriate of Potash	50 "	potash	200 "

This combination would contain the following:

Nitrogen	117 lbs.	or 5.85 per cent.
Phosphoric Acid	110 "	" 5.5 "
Potash	117 "	" 5.85 "

(3)

Nitrate of Soda	15 per cent	nitrogen	300 lbs.
Dried Blood	10 "	"	600 "
	2 "	phosphoric acid	
Dissolved Bone	14 "	" "	800 "
	2.5 "	nitrogen	
Sulphate of Potash	50 "	potash	300 "

This combination would contain the following:

Nitrogen	125 lbs.	or 6.25 per cent.
Phosphoric acid	124 "	" 6.2 "
Potash	150 "	" 7.5 "

Special attention is called to mixture No. 2, which, owing to the low price of cotton-seed meal, would furnish plant food more cheaply than either of the other combinations.

It is very easy to see that by varying the quantities of chemicals the mixture may be made to contain more of one ingredient and less of others.

Just here the question will arise,— "How shall I know what combination to use?" Only by observation and study. You should not adopt the successful rule of practice of some other man unless your conditions are entirely similar to his. And the only method admitting of intelligent and reliable observation is when fertilizing materials are applied with a full understanding of what they contain, so that it is possible to trace cause and effect. If you purchase these ingredients separately, you are then able to apply them singly, or combined in different forms and in different proportions. In this way you may attain a degree of knowledge applicable to your own business that will never be possible if you continue to buy the fixed formulas of the markets. This may be a hard doctrine, but it is nevertheless the means of salvation.

The agricultural public should study carefully the results of experiment station investigations, for in this way much will be learned, which, as general principles, will be important to every man's practice. But never will experiment stations relieve the individual of the necessity of making a close study of the needs and methods of his own environment.

Principles, the practitioner may be taught by others,— the right relation of the principles to his own business he must, in part at least, discover for himself, and in no field is there a larger opportunity for this than in the purchase and use of commercial fertilizers.

Discussion.

A gentleman remarked that some persons not familiar with plant culture regard all commercial fertilizers as similar in character to alcohol,— as only stimulants. But the truth is they are really plant food — as positively so as any stable manure. This has been proved by many careful experiments, including those by sand culture and water culture. As no healthy child could be reared on alcohol, so no plant life can be long sustained without being supplied with plant food.

William C. Strong asked whether the phosphates of iron and aluminum were undesirable.

Professor Jordan replied that for the horticulturist they are; as in his cultural work he had found their action to be too slow. But in farming operations, especially on land about to be laid down to grass, they may be valuable for their staying qualities, as they require much of "Nature's weathering" to develop their useful conditions.

Benjamin P. Ware asked what was meant by the terms "available" and "reverted" phosphoric acid.

Professor Jordan answered that those expressions represent an important fact. Available phosphoric acid — if such in reality — is that which can be rapidly taken up by growing plants. The term "available," as used in connection with fertilizer analysis, means the sum of the water-soluble and reverted (or citrate-soluble). "Reverted" should really be applied only to "that which has once been soluble in water, but by chemical change has gone back;" but is now used in the sense of "that which is soluble in ammonium citrate."

The question was asked, What is the relative value of wool-waste and hair-waste as compared with other materials in commercial fertilizers?

Professor Jordan replied that although rich in nitrogen, both are very slow to yield their fertilizing elements, unless they are broken down by chemical treatment or some process other than Nature's weathering; even then there are other sources which are preferable for the horticulturist. Cotton-seed meal, for this purpose, is this year sold in Maine at twenty dollars per ton. This yields six and three-fourths per cent of nitrogen; two and three-fourths per cent of phosphoric acid, and one and three-fourths per cent of potash. At the price named one can now get a supply of nitrogen from cotton-seed meal more cheaply than from any other source. (In the first two formulas given in the paper read today, the term acid phosphate refers to Florida rock, South Carolina rock, or bone-black, each in a dissolved state.)

The next question asked was, What fertilizing elements are derived from bones? To this Professor Jordan replied that bone furnishes phosphoric acid and nitrogen. If bones are steamed, that process takes away a portion of the nitrogenous matter, thus reducing the proportion of nitrogen in the fertilizer.

Mr. Ware expressed his delight that the essayist had given so outspoken a talk upon commercial fertilizers. Public speakers generally seem to be a little delicate about speaking their mind on this subject, out of regard for the feelings of manufacturers. The milkman who is wise supplies his cows with well balanced rations. All cultivated crops, to make the best growth, require well balanced rations as much as cattle. The soil of Massachusetts is generally deficient in potash, but the manufacturers of commercial fertilizers persist in putting on the market compounds that are made up of materials in wrong proportions — too much phosphoric acid and too little potash. Why should not our farmers and horticulturists purchase the ingredients which are needed in their soils and mix them on their own premises, in the proportions required in each case? All the conveniences necessary for this work are a barn-floor, a shovel, and a man; and proper mixing can be done for fifty cents per ton. Last year the speaker purchased his own selection of ingredients for what would be equivalent to ten tons of mixed fertilizers of which the price was forty dollars per ton; but he paid only about one-half the cost of so-called complete fertilizers. By following this plan one gets what he needs with no useless surplus, and will save at least one-third of the cost of an unknown mixture. In the paper read here today, Professor Jordan has touched upon one of the most important subjects to all who cultivate the soil; he has spoken the truth, openly and fearlessly, and it has been a great satisfaction to hear him state the facts.

Professor Jordan thanked Mr. Ware for so heartily indorsing his statements. He then said he wished to leave upon the minds of all present, this distinct impression: he would have a method of mixing fertilizing compounds with special regards for the needs of the different localities where they were to be used. If cultivating wheat in Pennsylvania, he would not buy so much nitrogen, because in the rotation of crops, clover would furnish that. But he would especially have regard paid to the requirements of market gardeners and forcing house men, whose soils are in so artificial a condition, that the gardeners practically furnish all the plant food their crops get or require. In such case the culturist needs to know what ingredients are necessary for each crop, and the relative proportions of each. He cannot find such mixtures in the market. His only course then, is to buy the

several materials and mix them himself, or, place an order for such mixtures with a reliable manufacturer. Professor Jordan stated that at present the manufacturer dictates to the farmer what he shall purchase, whereas the reverse should be true.

The question was then asked, What is the relative value of the liquid manure, and the solid product from stables?

Professor Jordan had no doubt that the loss, by the waste of the liquid manure of stables, was in many localities fully equal to the amount paid for artificial fertilizers. He believed that where the animals were well fed, the liquid manure constituted one-half or more of the commercial value of the whole product; but this valuable material is, by many farmers, allowed to run to waste.

To a question concerning the value of sulphate of ammonia, Professor Jordan replied that he regarded it with favor. It contains about twenty per cent of nitrogen. It is less likely to leach rapidly from the soil than nitrate of soda, and is sufficiently available for quick growing crops.

The question was asked, How does gas-lime rank as fertilizing material? In answer Professor Jordan said that when first received from the gas works, it consists chiefly of lime, with some addition of the sulphate, the sulphite, and the sulphide of lime; the last named, especially, is poisonous to vegetation, but if exposed a while in the open air, the poisonous properties disappear. The remaining lime, if put into the soil is of use by its chemical action upon inert matter there present, converting it into plant food.

In reply to a question whether potash is a necessary element of plant food, Professor Jordan said that if there is anything pretty well proven, it is that plants must have potash. Plants undoubtedly contain some potash which is in excess of a minimum portion that is absolutely essential. There is a minimum which plants must have, and which no other compound can replace.

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1895.

PART II.

BOSTON:
PRINTED FOR THE SOCIETY.
1896.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, April 6, 1895.

A duly notified Stated Meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

William C. Strong, Chairman of the Committee appointed at the last meeting to prepare a memorial of the late John J. Thomas, an Honorary Member of the Society, presented the following report:

REPORT OF THE COMMITTEE ON THE DEATH OF JOHN J. THOMAS.

It is not given to men engaged in the quiet industry of horticulture to arrest attention and startle the world by brilliant deeds or discoveries. The common lot with us is this, that we run our short race with average success, and then are gathered unto our fathers. Yet it is also true that such as these, who have with quiet faithfulness and marked ability acted well their part, have been of greatest service to mankind, and are entitled to lasting remembrance.

Such a man was John J. Thomas of Union Springs, N. Y., who ceased from his long life of earthly usefulness on the 22d of February last. Born in 1810, on the shore of the beautiful Cayuga Lake, in the heart of the great agricultural and horticultural Empire State, he identified himself with these interests at an early age, and soon took rank as a leader. In the year 1839 he became a regular contributor to the "Cultivator," published at

Albany, and upon the establishment of the "Country Gentleman" by Luther Tucker in 1853, he became associate editor, and held this important position for more than forty years, until compelled by ill health to resign in August last. During this long period he was unwearied in his writings, giving practical instructions in cultivation and suggestions as to buildings and farm machinery, with drawings from his own pencil, and replying to questions with unvarying patience and skill. During the same period he wrote "The American Fruit Culturist," a most comprehensive and authoritative work, which will be of enduring value; also a volume on "Farm Machinery," besides editing the nine volumes of "Rural Affairs," extending over twenty-seven years, their contents being indeed, chiefly from his pen and their many illustrations chiefly from his pencil. These writings were far from being the speculations of a theorist but rather were a record of the observation and experience of a man who came into actual contact with the soil. With him theory and practice went hand in hand. The smoothing-harrow, the pruning shears, the sliding gate, jarring of plum trees for the curculio, sanitary arrangements for outhouses, and a multitude of other methods which he devised, were all suggested by his own necessities as an extensive orchardist and nurseryman. It was for this reason that his opinions were regarded as of such practical value and were so constantly sought and prized.

It is not easy to estimate the wide influence which Mr. Thomas thus exerted throughout the country. But his interest was not limited to rural pursuits. His was a well-rounded character, active in all social, educational, moral, and religious questions of the day. With uniform kindliness, sterling integrity, and recognized sagacity, he gave expression to his views and widely influenced public opinion. When some great military captain is gone we recount his brilliant deeds of arms. When an eloquent statesman has run his course we magnify his masterly service. Shall we put a less value upon the work of him who in the quiet and unobtrusive walks of life has yet been a mighty power for good in all our wide land?

Mr. Thomas was elected an Honorary Member of the Massachusetts Horticultural Society in 1856. In the closing of this earthly life of our fellow-worker and friend this Society desires to express to his family its deep sympathy with them in their loss. May it not also join with them in grateful acknowledgment to the Author

of all being in the remembrance of the noble and useful life of our brother?

WILLIAM C. STRONG,
O. B. HADWEN,
ROBERT MANNING, } *Committee.*

The memorial was unanimously adopted.

The Annual Report of the Committee on Plants was read by the Secretary, accepted, and referred to the Committee on Publication.

The President, as Chairman of the Executive Committee reported from that Committee a recommendation that the Society appropriate $50 to defray the expense of the first volume of "Photographs and Descriptions of Old Trees of New England," prepared by the Committee on Large, Old, or Otherwise Interesting Trees. The appropriation was unanimously voted.

The amendments to the Constitution and By-Laws, ordered by a majority vote, at the Stated Meeting on the first Saturday in January, to be entered on the records, came up for further action. William C. Strong moved that the Constitution and By-Laws be taken up *de novo*, and be amended according to the report of the majority of the Committee on that subject, with certain changes which he proceeded to state. The majority report of the Committee on the Constitution and By-Laws, as thus amended, was read twice, and by a majority vote ordered to be entered on the records, and laid over for consideration at the Stated Meeting on the first Saturday in July. It was also voted that these proposed amendments be printed and distributed.

The following motion, offered by Leonard Thompson, was unanimously carried:

That the plan of the Rumford Historical Association in erecting a pillar marking the spot of the discovery of the Pecker, or, later named, Baldwin apple is approved as worthy by this Society.

The following named persons, having been recommended by the Executive Committee for membership in the Society were on ballot duly elected:

MRS. C. S. HATCH, of North Cambridge,
Professor JAMES F. BABCOCK, of Boston,
LIVINGSTON CUSHING, of Weston,
C. SIDNEY WALDO, of Jamaica Plain.

Upon recommendation of the Executive Committee,

Joseph Jefferson, of Buzzard's Bay,

was elected an Honorary Member of the Society, and

Professor Byron D. Halsted, of New Brunswick, N. J., was elected a Corresponding Member.

Adjourned to Saturday, May 4.

BUSINESS MEETING.

Saturday, May 4, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected:

Dudley L. Pickman, of Boston,
George H. Lyman, of Wareham,
George P. Gardner, of Boston.

The Secretary read a letter from Mrs. Mary H. Thomas, acknowledging the receipt of the memorial of her husband, John J. Thomas, adopted by the Society at its last meeting, and expressing the grateful appreciation of it by the family.

Also a letter from Professor Byron D. Halsted, acknowledging the receipt of his Diploma as a Corresponding Member of the Society, and thanking the Society therefor.

Also a letter from William J. Stewart, President of the Gardeners' and Florists' Club of Boston, inviting the members of this Society to attend a meeting of the club on the evening of Tuesday, the 7th instant, when Mr. Henry O'Meara would read a paper on "The Poetry of Flowers."

Adjourned to Saturday, June 1.

BUSINESS MEETING.

Saturday, June 1, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, Vice President Charles H. B. Breck in the chair.

The Librarian laid before the Society a copy of "L'Horticulture dans les Cinq Parties du Monde," a gift to the Library from the author, Charles Baltet, Président de la Société Horticole, Vigneronne, et Forestière de l'Aube, Troyes, France, and moved that the thanks of the Society be presented to M. Baltet for the gift of this most important work, which motion was unanimously carried.

The meeting was then dissolved.

BUSINESS MEETING.

SATURDAY, July 6, 1895.

A duly notified stated meeting of the Society was holden at eleven o'clock, Vice President C. H. B. BRECK in the chair.

On motion of Ex-President William C. Strong, it was voted to take up the consideration of the amendments to the Constitution and By-Laws, which received a majority vote at the Stated Meeting on the 6th of April and were laid over for consideration at this meeting, and they were finally adopted as reported by the Committee.

Adjourned to Saturday, August 3.

BUSINESS MEETING.

SATURDAY, August 3, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, Vice President C. H. B. BRECK in the chair.

The Chair announced the following named persons as the Committee to nominate candidates for Officers and Standing Committees for the next year, appointed by the President agreeably to the Constitution and By-Laws:

WILLIAM H. SPOONER, *Chairman*,

BENJAMIN M. WATSON, JR.,	PATRICK NORTON,
SAMUEL HARTWELL,	HENRY W. WILSON,
BENJAMIN P. WARE,	C. MINOT WELD.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected:

John T. Brown, of Newburyport,
Charles H. Souther, of Jamaica Plain,
Richard F. Barrett, of Concord.

Adjourned to Saturday, September 7.

BUSINESS MEETING.

Saturday, September 7, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder in the chair.

William H. Spooner, Chairman of the Committee to nominate candidates for Officers and Standing Committees for the year 1896, presented a printed list. This report was accepted and it was voted that the Committee be continued and requested to nominate candidates in place of any who might decline before the election.

Mr. Spooner announced the decease of Benjamin P. Cheney, and moved the appointment of a Committee to prepare an expression of the Society's regard for him. The motion was carried, and the Chair appointed as that Committee, Benjamin G. Smith, Benjamin C. Clark, and Walter Hunnewell.

The meeting was then dissolved.

BUSINESS MEETING.

Saturday, October 5, 1895.

A Stated Meeting of the Massachusetts Horticultural Society, being the annual meeting for the choice of Officers and Standing Committees was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The Secretary stated that the meeting had been duly notified to the members of the Society, agreeably to the Constitution and By-Laws.

William H. Spooner, Chairman of the Nominating Committee, reported that that Committee had nominated Frederick S. Davis as a member of the Committee on Flowers in place of Walter H. Cowing, who was unable to serve.

Agreeably to the Constitution and By-Laws the Chair appointed Samuel Hartwell, James Wheeler, and A. Chandler Manning, a Committee to receive, assort, and count the votes given, and report the number.

On motion of Mr. Spooner it was voted that the polls remain open for two hours. The polls were opened at twelve minutes past eleven o'clock.

Benjamin G. Smith, Chairman of the Committee appointed at the last meeting to prepare a memorial of Benjamin P. Cheney, reported the following:

Benjamin Pierce Cheney was one of New England's noblest sons, and was an honored and respected member and benefactor of the Massachusetts Horticultural Society. He was born in New Hampshire; the personal friend and admirer of Daniel Webster, he presented to the State of New Hampshire the finest bronze statue of the departed statesman ever executed. He was one of three gentlemen, members of the Massachusetts Horticultural Society, who presented the three beautiful statues of Flora, Pomona, and Ceres which adorn this building. He was a member of the Finance Committee from 1867 to 1880 inclusive. He was one of the most successful business men of our time. His generosity without ostentation through his long and successful business life, his fidelity, his urbanity, and the uniform consistency of character for which he was distinguished, have secured for him a high place in the estimation of his fellow citizens. He was upright in business and attached to him his numerous employees, many of whom remained with him during his long business life. No better evidence of his honorable course can be given. We who knew him thoroughly can testify to his princely gifts unknown to the public; he never sought but avoided notoriety in dispensing his benefactions; thousands of dollars at a time were given by him for worthy objects unknown to the world. He

was the architect of his own fortune; self-reliant he depended upon his own judgment in making his investments. With all his activity he found time to cultivate his intellectual endowments, with which he was unusually gifted.

His view of life and duty was broad; his tastes and conversation refined. His was a well-balanced and symmetrical nature. His conversational powers were of the highest order. It was a pleasure to listen to him, and those who had the pleasure of his acquaintance and friendship can never forget him.

Resolved, That in the death of Mr. Cheney not only this Society but the whole community suffer a severe and irreparable loss.

Resolved, That these sentiments of respect and affection, with the earnest expression of sincere condolence be communicated to the bereaved family of the deceased.

BENJAMIN G. SMITH,
BENJAMIN C. CLARK,
WALTER HUNNEWELL, } *Committee.*

The memorial was unanimously adopted.

The President, as Chairman of the Executive Committee, reported a recommendation that the Society make an additional appropriation of $200 for the Flower Committee the present year. The report was accepted and the appropriation was voted.

The following named persons, having been recommended by the Executive Committee as members of the Society, were upon ballot duly elected:

WILLIAM S. KEMP, of Brookline,
JOHN CROWLEY, of Dedham,
AMORY A. LAWRENCE, of Boston,
AMOS A. LAWRENCE, of Boston,
ORLENDO W. DIMICK, of Watertown,
MRS. I. TISDALE TALBOT, of Boston.

CHARLES BALTET, Président de la Société Horticole, Vigneronne, et Forestière de l'Aube, Troyes, France, was upon recommendation of the Executive Committee elected a Corresponding Member of this Society.

The polls were closed at twelve minutes past one o'clock, and the Committee to receive, assort, and count the votes, and report the number given, reported the whole number to be one hundred and one, and that the persons named on the ticket reported by the Nominating Committee had a plurality of votes and were elected.

The report of the Committee was accepted, and the above mentioned persons were, agreeably to the Constitution and By-Laws, declared by the President to have a plurality of votes and to be elected Officers and Standing Committees of the Society for the year 1896.

Adjourned to Saturday, November 2.

BUSINESS MEETING.

Saturday November 2, 1895.

The last meeting of the Society adjourned to today, and the members present were called to order by the President, but no quorum was present, and the meeting

Adjourned to Saturday, December 7.

BUSINESS MEETING.

Saturday, December 7. 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The President, as Chairman of the Executive Committee, reported a recommendation from that Committee that the Society make the following appropriations for Prizes and Gratuities for the year 1896, viz.:

For Plants,	$2,000
" Flowers,	2,600
" Fruits,	1,800
" Vegetables,	1,150
" Gardens,	500
Total,	$8,050

The report was accepted, and, agreeably to the Constitution and By-Laws, was laid over for final action at the Stated Meeting of the Society on the first Saturday in January, 1896.

The President further reported from the Executive Committee a recommendation that the Society appropriate $300 for the Committee on Lectures and Publication, this sum to include the income of the John Lewis Russell Fund. This report was accepted and laid over until the first Saturday in January.

John G. Barker, Chairman of the Committee on Gardens, made a partial report, being the awards of Prizes and Gratuities made by that Committee, and asked for further time to prepare the remainder of the report. The report, so far as made, was accepted and further time was granted.

E. W. Wood, Chairman of the Committee on Fruits, read the Annual Report of that Committee, and also his report as Delegate to the State Board of Agriculture.

Joseph H. Woodford, Chairman of the Committee of Arrangements, read the Annual Report of that Committee.

Arthur H. Fewkes, Chairman of the Committee on Flowers, read the Annual Report of that Committee.

Azell C. Bowditch, Chairman of the Committee on Plants, read the Annual Report of that Committee.

These five reports were severally accepted and referred to the Committee on Publication.

The following named persons, having been recommended by the Executive Committee for membership in the Society, were on ballot duly elected:

Robert D. Ireland, of Winthrop,
George M. Anderson, of Milton,
Charles W. Hallstram, of Boston,
Edward Hatch, of Boston,
H. Fisher Eldredge, of Boston,
Hon. Edward P. Shaw, of Newburyport,
James E. Rothwell, of Brookline,
Alexander Montgomery, of Natick,
Joseph W. Howard, of Somerville,
Mrs. Elizabeth S. Cheney, of Wellesley,
George A. Gardner, of Boston,
Micajah Pratt Clough, of Lynn.

The Secretary laid before the Society a letter from Mrs. Elizabeth S. Cheney to Benjamin G. Smith, Chairman of the Committee to prepare a memorial of the late Benjamin P. Cheney, acknowledging the receipt of the memorial and returning heartfelt thanks therefor, from herself and family.

Also a letter from Charles Baltet, of Troyes, France, acknowledging the receipt of the notice of his election as a Corresponding Member of the Society, expressing his pleasure at this action of the Society, and offering to the Library any of his works that are not already in it.

Adjourned to Saturday, December 21.

BUSINESS MEETING.

Saturday, December 21, 1895.

The last meeting of the Society adjourned to today, and the members present were called to order by the President, but no quorum was present and the

Meeting was dissolved.

REPORT

OF THE

COMMITTEE ON PLANTS,

FOR THE YEAR 1895.

By AZELL C. BOWDITCH, Chairman.

Another year has passed over our heads, but we can hardly congratulate ourselves upon any very marked improvement in our exhibitions, with the exception of Orchids and Chrysanthemums, both of which were very fine and showed much improvement over former years. The absence of some of our larger growers of greenhouse plants was quite marked, and that very interesting class of trees, the Conifers, which are not only ornamental but instructive, was sadly missed the past season. But every Saturday, from early in the year to its close, has brought enough to please the eye and foster the ever-growing interest of both the amateurs and the public. The love of plants is ever on the increase and it will be the aim of your Committee, in the future as in the past, to encourage it by awarding the most liberal prizes offered by the Society, in as judicious and impartial a manner as possible.

The first exhibit for prize was on February 12, for Chinese Primroses, for which there were two competitors, John L. Gardner and Mrs. Benjamin P. Cheney.

Nathaniel T. Kidder showed a fine plant of *Acacia heterophylla*.

January 26, from the Botanic Garden of Harvard University came a fine plant of *Angræcum sesquipedale*, with seven spikes, having sixteen blooms.

February 21. The Society offered $100 in prizes for Palms and other Decorative Plants at the meeting of the American Carnation Society, which was competed for by Nathaniel T. Kidder and John L. Gardner. John M. Anderson also made a very fine display of Cyclamens. George M. Nicholson showed some fine Cinerarias grown in six-inch pots.

March 11. William H. Spooner showed the Crimson Rambler Rose. Too much cannot be said of this introduction, as it fills a place long vacant in the gardens. The Bussey Institution exhibited some fine Anemones, and James Comley a plant of *Rhododendron Livingstonii*.

SPRING EXHIBITION.

March 26, 27, 28, and 29.

The display of Orchids, Azaleas, Cyclamens, Tulips, Hyacinths, and Narcissuses, with other Spring Flowering Bulbs, was remarkably fine. Dr. C. G. Weld and James Comley made fine displays of Indian Azaleas.

Mrs. Frederick L. Ames made a magnificent display of Orchids, among which were *Cattleya Trianæ*, *C. Mossiæ*, and *C. Mendelli*, *Odontoglossum grande*, *O. aspersum*, *O. cordatum*, *Cypripedium Measuresianum*, *C. vexillarium*, and many others, in all about fifty plants.

The Bussey Institution made a nice showing of India Azaleas. Edward Butler and Dr. C. G. Weld exhibited some fine plants. Mr. Butler also had three fine Orchids.

The Cyclamens were the finest ever exhibited; the plants from Mrs. Benjamin P. Cheney were two feet in diameter and covered with hundreds of blooms; other exhibitors were George M. Anderson, Dr. C. G. Weld and Nathaniel T. Kidder.

Cinerarias were exhibited by George M. Anderson, John L. Gardner, Mrs. Benjamin P. Cheney, and James Carthley.

The *Ouvirandra fenestralis* or Madagascar Lace Plant was exhibited by Elisha S. Converse; this most beautiful and curious aquatic plant attracted much attention.

The rest of the exhibition was made up of some very fine displays of Tulips, Hyacinths, Narcissuses, Lilies of the Valley, Freesias, Tritonias, etc., the whole forming one of the finest displays of Spring Flowering Plants and Bulbs ever held in the hall.

MAY EXHIBITION.

May 4.

In the class of Pelargoniums Nathaniel T. Kidder had no competitor.

In the Calceolarias there was quite a rivalry, the first prize going to Dr. C. G. Weld for six nicely grown plants, remarkable for the brilliant green and closeness of their foliage. Dr. Weld also exhibited fifteen plants of Streptocarpus.

Nathaniel T. Kidder showed *Cymbidium Lowianum.*

May 24, Walter H. Cowing exhibited a new seedling Canna; it was of a bright clear yellow with lips spotted with carmine, for which he was awarded a First Class Certificate of Merit.

June 6, Mrs. Frederick L. Ames and John L. Gardner made fine displays of Orchids.

The exhibit of Cattleyas from John L. Gardner, was particularly good; indeed your Committee thought it the best ever made in the hall.

ROSE AND STRAWBERRY EXHIBITION.

June 20 and 21.

There was but one exhibit of Stove and Greenhouse plants, by Dr. C. G. Weld. John L. Gardner sent a fine plant of Rhynchospermum, exhibited as a specimen plant. James Comley showed a large plant of Rhododendron. Dr. C. G. Weld and Elisha S. Converse exhibited some good plants of Tuberous Begonias.

July 20, Oakes Ames, exhibited *Cypripedium bellatulum* and *C. Chamberlainianum.*

July 27, Mrs. Frederick L. Ames exhibited *Cypripedium Annie Measures*, a cross between *C. Dayanum* and *C. bellatulum*, for which she was awarded a First Class Certificate of Merit.

E. V. R. Thayer exhibited six plants of *Saintpaulia Ionantha*, which belongs to the Gesneria family. Seed sown in February flowers in July, and it may become a very desirable house plant. Awarded a First Class Certificate of Merit.

August 1, William Wallace Lunt sent *Cattleya Rex.* This is one of the most beautiful and highly colored of the Cattleyas. Awarded a First Class Certificate of Merit.

August 10, The Botanic Garden of Harvard University exhibited a plant of *Agave Kerchovei*, with flower stem nineteen feet high — quite a curiosity. Nicholson's "Dictionary of Gardening," says that the flower is unknown. Awarded a gratuity.

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

September 4 and 5.

There was no exhibit of Hardy Coniferous Trees. Your Committee have thought it advisable to increase the prizes as they were too small to induce growers to handle them. It is hoped the coming season, with the larger prizes, to have a creditable show. This exhibition was again notable for the absence of Greenhouse plants, such as Palms, Aralias, Cycads, Ferns, etc., in groups. For the six plants and single specimens there were the usual competitors.

Mrs. Frederick L. Ames exhibited a beautiful plant of *Sophro-Lælia Veitchii*, for which a Silver Medal was awarded; also a plant of *Cypripedium Miss Ames*, a new hybrid, which received a First Class Certificate of Merit.

October 19, Rea Brothers exhibited a plant of *Scabiosa Caucasica* var. *alba*, a new perennial said to be hardy; if it proves so it will be quite an acquisition. It received the award of Honorable Mention.

CHRYSANTHEMUM EXHIBITION.

November 5, 6, 7, and 8.

In commenting on this exhibition your Committee would say that while the plants were grand and were the best ever seen in these halls, and perhaps as good as any seen on the other side of the ocean, they must deprecate the use of superfluous stakes and in order to further their disuse your Committee have offered three prizes for plants grown to a single stem, with bushy tops, and without the aid of stakes, hoping by this means to bring into the market a class of plants more suitable for table and window decoration. The varieties in the collection from Nathaniel T.

Kidder (William J. Martin, gardener), which took the first prize for twelve plants of any or all classes, were:

Clinton Chalfant,	Joseph H. White,
Golden Hair,	Louis Boehmer,
H. L. Sunderbruch,	Portia,
Iora,	Superbiflora,
Ivory,	Vernal Fall,
John Shrimpton,	W. H. Lincoln.

Walter Hunnewell (T. D. Hatfield, gardener), exhibited a group of twelve plants that were a great credit to him. The Committee were put to their best endeavors to award this prize, the competition was so close.

Mr. Hunnewell's Collection comprised

Clinton Chalfant,	Mirabeau,
Columbine,	Octavia,
George W. Childs,	Portia,
Joseph H. White,	Primula,
Louis Boehmer,	Theo,
Louis Menand,	W. H. Lincoln.

Mr. Kidder had for his Specimen Japanese a most beautiful plant of the pink Iora, which for good points probably never had its equal in this country. It was fully six feet high and as many in diameter.

The names of other exhibitors may be found in the award of prizes in the different classes.

The Society's appropriation was . .		$2,100 00
Prizes awarded	$1,643 00	
Gratuities awarded	371 00	
Two silver medals awarded . . .	10 00	
	$2,024 00	
Balance unexpended,	76 00	
		2,100 00

A. C. Bowditch,
James Comley,
James Wheeler,
William Robinson,
David Allan,
} *Committee.*

PRIZES AND GRATUITIES AWARDED FOR PLANTS.

1895.

January 12.

Chinese Primroses.— Six plants in six-inch pots, John L. Gardner $5 00
Second, Mrs. Benjamin P. Cheney 4 00
Third, John L. Gardner 3 00
Lachenalias.— Three six-inch pots, the second prize to John L. Gardner 3 00

Gratuities:—
Nathaniel T. Kidder, *Acacia heterophylla* 3 00
Margaret L. Waite, *Ornithogalum rigidulum* 1 00

MEETING OF THE AMERICAN CARNATION SOCIETY.

February 21 and 22.

Palms and Other Decorative Plants.— Best display, Nathaniel T. Kidder 50 00
Second, John L. Gardner 30 00

Gratuities:—
George M. Anderson, Display of Cyclamens 15 00
Nathaniel T. Kidder, " " " 5 00
George M. Nicholson, " " Cinerarias 6 00

March 11.

Gratuities:—
Bussey Institution, Display of Anemones 3 00
James Comley, *Rhododendron Livingstonii* 3 00

SPRING EXHIBITION.

March 26, 27, 28, and 29.

Theodore Lyman Fund.

Indian Azaleas.— Six distinct named varieties, in pots, Dr. C. G. Weld 30 00
Second, James Comley 20 00
Orchids.— Display, with Foliage Plants, arranged for effect in a space eight feet by five feet, Mrs. Frederick L. Ames . . 30 00
Second, John L. Gardner 25 00

Society's Prizes.

Indian Azaleas.—Four distinct named varieties, in not exceeding ten-inch pots, Bussey Institution	12 00
Second, Bussey Institution	10 00
Two distinct named varieties, Mrs. Henry F. Durant	6 00
Second, Dr. C. G. Weld	4 00
Specimen plant, named, Mrs. Henry F. Durant	8 00
Second, Bussey Institution	6 00
Single plant of any named variety, in not exceeding an eight-inch pot, Elisha S. Converse	5 00
Second, Dr. C. G. Weld	4 00
Orchids.—Three plants in bloom, Mrs. Henry F. Durant	10 00
Single plant in bloom, Mrs. Henry F. Durant	5 00
Second, Nathaniel T. Kidder	4 00
Third, John L. Gardner	3 00
Stove or Greenhouse Plants.—Specimen in bloom, other than Azalea or Orchid, named, John L. Gardner	8 00
Second, Dr. C. G. Weld	6 00
Hard-wooded Greenhouse Plants.—Four, in bloom, Dr. C. G. Weld	8 00
Second, Dr. C. G. Weld	6 00
Hardy Flowering Deciduous Shrubs, other Than Azaleas, Forced.—Four, of four distinct species, named, Bussey Institution	8 00
Second, Bussey Institution	6 00
Hardy Azaleas.—Six plants, Bussey Institution	10 00
Second, Bussey Institution	8 00
Hardy Flowering Evergreen Shrubs, Forced.—Four, of four distinct species, Bussey Institution	8 00
Cyclamens.—Ten plants in bloom, Mrs. Benjamin P. Cheney	15 00
Second, George M. Anderson	12 00
Third, Mrs. Benjamin P. Cheney	10 00
Fourth, Dr. C. G. Weld	8 00
Ten plants in bloom, in not over seven-inch pots, Dr. C. G. Weld	8 00
Second, Mrs. Benjamin P. Cheney	6 00
Third, George M. Anderson	4 00
Single plant in bloom, Nathaniel T. Kidder	5 00
Second, Mrs. Benjamin P. Cheney	4 00
Third, Mrs. Benjamin P. Cheney	3 00
Hardy Primroses.—Ten plants of distinct varieties, in bloom, John L. Gardner	5 00
Polyanthuses.—Ten plants, Fancy and Gold Laced, Bussey Institution	5 00
Auriculas.—Six, in pots, Dr. C. G. Weld	3 00
Second, Dr. C. G. Weld	2 00

Cinerarias.— Six varieties in bloom, George M. Anderson	8 00
Second, John L. Gardner	6 00
Third, Mrs. Benjamin P. Cheney	5 00
Three varieties in bloom, James Carthley	5 00
Second, George M. Anderson	4 00
Single plant in bloom, James Carthley	3 00
Second, John L. Gardner	2 00
Ouvirandra fenestralis.— Elisha S. Converse	12 00

Spring Flowering Bulbs.

Hyacinths.— Twelve distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	10 00
Second, Bussey Institution	8 00
Six distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	6 00
Second, Elisha S. Converse	5 00
Third, Bussey Institution	4 00
Three distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	4 00
Second, Elisha S. Converse	3 00
Third, Bussey Institution	2 00
Single named bulb, in pot, in bloom, Elisha S. Converse	2 00
Second, Dr. C. G. Weld	1 00
Three pans, not to exceed twelve inches, ten bulbs of one variety in each pan, Bussey Institution	10 00
Second, Dr. C. G. Weld	8 00
Third, Dr. C. G. Weld	6 00
Two pans, not to exceed twelve inches, with ten bulbs of one variety in each pan, Dr. C. G. Weld	8 00
Second, Bussey Institution	6 00
Third, Bussey Institution	5 00
Single pan, not to exceed twelve inches, with ten bulbs of one variety, Dr. C. G. Weld	5 00
Second, Elisha S. Converse	4 00
Third, Bussey Institution	3 00
Tulips.— Six eight-inch pans, nine bulbs of one variety in each, in bloom, Dr. C. G. Weld	5 00
Second, William S. Ewell & Son	4 00
Third, Bussey Institution	3 00
Three eight-inch pans, nine bulbs of one variety in each, in bloom, Elisha S. Converse	4 00
Second, William S. Ewell & Son	3 00
Third, Bussey Institution	2 00
Three ten-inch pans, twelve bulbs of one variety in each pan, Dr. C. G. Weld	6 00
Second, Bussey Institution	5 00
Third, William S. Ewell & Son	4 00
Fourth, Bussey Institution	3 00

Polyanthus Narcissus.—Four seven-inch pots, three bulbs in each, distinct varieties, in bloom, Dr. C. G. Weld	6 00
Second, Dr. C. G. Weld	4 00
Third, Bussey Institution	3 00
Jonquils.— Six six-inch pots, the number of bulbs in each to be at discretion of the grower, in bloom, Bussey Institution	5 00
Second, William S. Ewell & Son	3 00
Third, Dr. C. G. Weld	2 00
Lilium longiflorum.— Three pots, not exceeding ten inches, Bussey Institution	8 00
Lilium Harrisii.— Three pots, not exceeding ten inches, Bussey Institution	8 00
Lily of the Valley.— Six six-inch pots, in bloom, Bussey Institution	5 00
Second, William S. Ewell & Son	4 00
Anemones.— Three pots or pans, Bussey Institution	5 00
Second, Bussey Institution	4 00
Freesias.— Six pots or pans, Dr. C. G. Weld	5 00
Second, John L. Gardner	4 00
Third, Bussey Institution	3 00
Ixias.— Six pots in varieties, Dr. C. G. Weld	4 00
Tritonia crocata.— Six pots, Dr. C. G. Weld	4 00
Roman Hyacinths.—Six eight-inch pans, ten bulbs in each pan, Dr. C. G. Weld	5 00
Second, William S. Ewell & Son	4 00
Third, Bussey Institution	3 00

Prize for Florists Only.

General Display of Spring Bulbs.— All classes, William S. Ewell & Son	12 00

Gratuities:—

James Comley, Display of thirty pots of Roses, etc.	20 00
Botanic Garden of Harvard University, *Phaius grandifolius*	5 00
David Nevins, *Primula obconica*	2 00
David Allan, Display of Orchids	3 00
David Nevins, Roses in pots	2 00
Charles J. Power, Lily of the Valley	5 00
Nathaniel T. Kidder, Display	8 00
Bussey Institution, "	5 00
Dr. C. G. Weld, "	5 00

March 23.

Gratuity:—

Edward Butler, *Dendrobium nobile*	8 00

April 13.

Gratuities:—

John L. Gardner, Display of Orchids	5 00
H. Hollis Hunnewell, Plant of Crimson Rambler Rose	2 00

MAY EXHIBITION

May 4.

PELARGONIUMS.— Six named Show or Fancy varieties, in not less than eight-inch pots, in bloom, Nathaniel T. Kidder . . 8 00
Six named Zonale varieties, in pots, in bloom, Nathaniel T. Kidder 6 00
INDIAN AZALEAS.— Six plants in pots, named, C. Minot Weld . 15 00
Second, John L. Gardner 12 00
Single specimen, Nathaniel T. Kidder 5 00
Second, John L. Gardner 4 00
CALCEOLARIAS.—Six varieties, in pots, Dr. C. G. Weld . . . 8 00
Second, Elisha S. Converse 6 00
Third, John L. Gardner 4 00
Single plant, Dr. C. G. Weld 3 00
Second, Mrs. Benjamin P. Cheney 2 00
Third, Mrs. Benjamin P. Cheney 1 00

Gratuities:—
Dr. C. G. Weld, *Lomaria gibba* and fifteen plants of Streptocarpus, etc. 8 00
Walter Hunnewell, Plants of *Calceolaria rugosa*, (a shrubby species) 2 00
Nathaniel T. Kidder, *Cymbidium Lowianum* 2 00
John L. Gardner, Collection of Orchids, etc. 15 00

May 18.

Gratuities:—
John L. Gardner, *Wistaria Sinensis* 4 00
John L. Gardner, Orchids 10 00

May 24.

Gratuities:—
John L. Gardner, Display of Orchids 8 00

June 6.

Gratuities:—
John L. Gardner, Display of Cattleyas (forty plants) . . . 25 00
Mrs. Frederick L. Ames, Display of Orchids 20 00

June 15.

Gratuities:—
James Comley, Display of Cattleyas 2 00

ROSE AND STRAWBERRY SHOW.

June 20 and 21.

STOVE AND GREENHOUSE FLOWERING PLANTS.—Two distinct named varieties, in bloom, no Orchid admissible, Dr. C. G. Weld . 15 00

Specimen Plant in Bloom.— Named, other than Orchid, John L. Gardner, *Rhynchospermum jasminoides*	7 00
Second, James Comley, *Rhododendron Livingstonii*	5 00
Specimen Foliage Plant.— New and rare, other than Orchid, the Second prize to Dr. C. G. Weld	5 00
Hard-wooded Greenhouse Plants.— Three, of three distinct named varieties, in bloom, John L. Gardner	8 00
Second, John L. Gardner	6 00
Orchids.— Six plants, of six named varieties, in bloom, John L. Gardner	25 00
Three plants, of three named varieties, in bloom, the Second prize to John L. Gardner	10 00
Single specimen, named, Dr. C. G. Weld	8 00
Second, John L. Gardner	6 00
Tuberous Begonias.— Six pots, of six varieties, Dr. C. G. Weld	6 00
Second, Elisha S. Converse	4 00
Gratuities :—	
John L. Gardner, Display of Orchids	15 00
David Allan, *Allamanda Williamsonii*	1 00

June 29.

Gratuity :—	
Joseph Tailby, *Brassia verrucosa*	2 00

July 20.

Hydrangeas.— Pair, in tubs or pots, Samuel J. Trepess	8 00
Single plant, in tub or pot, Samuel J. Trepess	5 00
Gloxinias.— Six pots, in bloom, the Second prize to John P. Spaulding	4 00
Gratuities :—	
Oakes Ames, *Cypripedium bellatulum* and *C. Chamberlainianum*	3 00

July 27.

Gratuity :—	
Mrs. D. E. Butterfield, Gloxinia Plant	1 00

August 3.

Gratuity :—	
Oakes Ames, *Ophiopogon spicatus aureo variegatus*	1 00

August 10.

Gratuity :—	
Bussey Institution, Achimenes	1 00

August 24.

Gratuities :—	
Elisha S. Converse, *Gymnogramme Peruviana*	2 00
Botanic Garden of Harvard University, *Agave Kerchovei*	5 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

SEPTEMBER 4 AND 5.

Special Prizes Offered by the Society.

PALMS.— Pair, in pots or tubs not more than twenty-four inches in diameter, Dr. C. G. Weld 12 00
Second, Nathaniel T. Kidder 8 00
Pair, in pots not more than fourteen inches in diameter, Elisha S. Converse 8 00
Second, Nathaniel T. Kidder 6 00

Regular Prizes.

GREENHOUSE PLANTS.— Six Greenhouse and Stove Plants, of different named varieties, two Crotons admissible, Nathaniel T. Kidder 30 00
Second, John L. Gardner 25 00
Third, Dr. C. G. Weld 20 00
Single plant for table decoration, dressed at the base with living plants only, only one entry admissible, Elisha S. Converse . 6 00
Second, John McKenzie 4 00
Third, Moses T. Stevens 3 00
SPECIMEN FLOWERING PLANT.— Single named variety, Nathaniel T. Kidder 8 00
FUCHSIAS.— Six, in not over ten-inch pots, Nathaniel T. Kidder . 6 00
ORNAMENTAL LEAVED PLANTS.— Six named varieties, not offered in the collection of greenhouse plants, Crotons and Dracænas not admissible, Dr. C. G. Weld 20 00
Second, James Comley 15 00
Third, Nathaniel T. Kidder 12 00
Single specimen, variegated, named, not offered in any collection, Nathaniel T. Kidder 6 00
Second, Dr. C. G. Weld 5 00
Third, John L. Gardner 4 00
CALADIUMS.— Six named varieties, Dr. C. G. Weld . . . 6 00
Second, Nathaniel T. Kidder 4 00
FERNS.— Six named varieties, no Adiantums admissible, Nathaniel T. Kidder 10 00
Second, Dr. C. G. Weld 8 00
ADIANTUMS.—Five distinct named species, other than Farleyense, Dr. C. G. Weld 8 00
TREE FERN.— Single specimen, named, not less than six feet in height, Elisha S. Converse 10 00
LYCOPODS.— Four named varieties, Nathaniel T. Kidder . . . 5 00
Second, Dr. C. G. Weld 4 00
DRACÆNAS.— Six named varieties, Dr. C. G. Weld 8 00
Second, Nathaniel T. Kidder 6 00

Crotons.— Six named varieties, in not less than twelve-inch pots, Dr. C. G. Weld	6 00
Second, Dr. C. G. Weld	5 00
Third, John L. Gardner	4 00
Cycad.— Single plant, named, Mrs. Anna D. Wood	10 00
Second, Elisha S. Converse	8 00
Orchids.— Six plants, named varieties, in bloom, John L. Gardner	15 00
Tuberous Begonias.— Six pots of six varieties, Dr. C. G. Weld	6 00
Gratuities:—	
J. W. Howard, Seedling Coleus	2 00
Botanic Garden of Harvard University, Collection	30 00
Elisha S. Converse, Collection	10 00
David Allan, Collection	4 00

September 21.

Gratuity :—	
Botanic Garden of Harvard University, Twelve plants of *Nerine Sarniensis*	3 00

September 28.

Gratuity :—	
Jason S. Bailey, Display of Orchids	3 00

October 2.

Gratuity:—	
Nathaniel T. Kidder, Display of plants	25 00

CHRYSANTHEMUM EXHIBITION.

November 5, 6, 7, and 8.

Chrysanthemums.— Display of twelve named plants any or all classes, distinct varieties, Nathaniel T. Kidder	60 00
Second, Walter Hunnewell	50 00
Fourth, H. Fisher Eldredge	30 00
Twelve plants of twelve different varieties grown to one stem and bloom, in not over six-inch pots, preference being given to plants not more than three feet in height, Dr. C. G. Weld	12 00
Second, James L. Little	10 00
Third, Elisha S. Converse	8 00
Fourth, Jason S. Bailey	6 00
Red, six plants grown as above but all of one color and different varieties, Dr. C. G. Weld	6 00
Second, James L. Little	5 00
Third, Elisha S. Converse	4 00
White, Dr. C. G. Weld	6 00
Second, James L. Little	5 00
Third, Donald McRea	4 00
Pink, James L. Little	6 00
Second, Dr. C. G. Weld	5 00
Third, Elisha S. Converse	4 00

Yellow, Donald McRea	6 00
Second, James L. Little	5 00
Third, Dr. C. G. Weld	4 00
Any other color, Dr. C. G. Weld	6 00
Second, James L. Little	5 00
Group of plants, arranged for effect, limited to one hundred and fifty square feet, preference being given to collections with palms or other foliage added, Mrs. Benjamin P. Cheney	45 00
Second, J. W. Howard	40 00
Third, A. W. Blake	35 00
Fourth, Bussey Institution	30 00
Fifth, H. F. Eldredge	25 00
Six Japanese, distinct named varieties, Mrs. Benjamin P. Cheney	20 00
Second, Mrs. Benjamin P. Cheney	15 00
Third, Nathaniel T. Kidder	10 00
Specimen Japanese, named variety, Nathaniel T. Kidder	6 00
Second, Mrs. Benjamin P. Cheney	5 00
Third, Walter Hunnewell	4 00
Specimen Pompon, named variety, Arthur Hunnewell	4 00
Gratuities:—	
William H. Elliott, Display	25 00
Mrs. Benjamin P. Cheney, Display of *Adiantum Farleyense*	25 00
Dr. C. G. Weld, Ericas	4 00
Jason S. Bailey, Display,	4 00

NOVEMBER 16.

Gratuity:—	
James Comley, Pots Seedling Chrysanthemum Francis B. Hayes	3 00

SOCIETY'S SILVER MEDAL.

January 26. Botanic Garden of Harvard University, *Angræcum sesquipedale.*

Annual Exhibition, September 4 and 5. Mrs. Frederick L. Ames, *Sophro-Lælia Veitchii.*

FIRST CLASS CERTIFICATES OF MERIT.

March 11. William H. Spooner, Crimson Rambler Rose.

May 24. Thomas H. Westwood, New Seedling Canna.

July 27. Mrs. Frederick L. Ames, *Cypripedium Annie Measures*, cross between *Cypripedium bellatulum* and *C. Dayanum.*

July 27. E. V. R. Thayer, *Saintpaulia Ionantha.*

August 1. William W. Lunt, Cattleya Rex.

Annual Exhibition, September 4 and 5. Mrs. Frederick L. Ames, *Cypriped ium Miss Ames.* (New.)

HONORABLE MENTION.

October 19. Rea Brothers, *Scabiosa Caucasica*, variety *alba.* Hardy perennial.

REPORT

OF THE

COMMITTEE ON FLOWERS,

FOR THE YEAR 1895.

By ARTHUR H. FEWKES, Chairman.

The Committee on Flowers have but little to report for the past year that is of exceptional interest, as the displays have differed but little from those of previous years, although as a whole our exhibitions have averaged better than ever before, particularly in the number of exhibits and in the fewer inferior flowers shown.

The exhibitions during the early months of the year, though not numerous, were excellent and helped very much to enliven the hall at our weekly meetings. Francis Brown Hayes was the principal exhibitor.

The displays of Wild Flowers have been as popular as in previous seasons, and have assumed an importance second to that of no other department in their educational value, and, almost unconsciously it seems, the Society has established a School of Botany, which is quite unique in its way. Nowhere else can the student of that science find such an opportunity for the study of our Native Flora. It has gone beyond a simple matter of local interest, for the reputation of these displays has spread far and wide and there are many who visit our weekly shows purposely to study these exhibits.

When we consider the growing importance of this branch, we can but feel the necessity for competent botanists to act as

judges. A florist, a gardener, or a horticulturist is not necessarily a botanist, and it seems an injustice to both the exhibitor and the judges, that the Flower Committee should be compelled to judge these displays.

The Royal Horticultural Society of England has its Botanical Committee and why can not we also have one? They take charge of all displays of purely botanical interest and are a valuable addition to the Standing Committees of the Society. Such a committee might be entirely independent or act as a division of the regular Flower Committee.

The displays of Carnations on February 21 and 22, when the American Carnation Society held their Annual Meeting, should be mentioned, although the exhibition was not one of our own, but belonged to that Society. It was a grand display of this popular flower, making one wish that we might have a repetition of it annually.

On March 16, a First Class Certificate of Merit was awarded to Alexander McKay, gardener to David Nevins, for superior cultivation of Hybrid Roses under glass, he having made exhibits of flowers which we have never seen equalled. On the same date First Class Certificates of Merit were awarded to Sewall Fisher of Framingham, for a beautiful white seedling Carnation, named Crystal, and Fred Dorner of Lafayette, Ind., for his white seedling Carnation, Storm King. These two varieties are very promising and are superior to other white varieties in cultivation.

SPRING EXHIBITION.

March 26, 27, 28, and 29.

At this exhibition the cut flowers were well represented and were a marked improvement over last year. We were pleased to note a revival of interest in forced Hybrid Roses, which were almost entirely absent from our last Spring Show. There was also more interest shown in the Tea Roses, of which there were excellent examples of several varieties. Carnations are always well represented at this show and are destined to be one of the leading features of it if they receive the encouragement due so beautiful a flower.

The display of Violets was quite remarkable, particularly the flowers shown by David Nevins (Alexander McKay gardener), which were the largest we have ever had the pleasure of examining.

The Antirrhinum is making a place for itself as a winter flower and attracted much attention.

James Comley made a very beautiful display with forced flowers of a form of *Clematis montana* which he raised from seed collected in Japan. If this form proves hardy in this latitude it will be a grand addition to our hardy vines.

MAY EXHIBITION.

May 4.

The displays of flowers at this exhibition were not extensive but were mostly good. Tulips were very poorly shown and there was but one exhibitor of Herbaceous Plants. William Nicholson showed remarkably fine Carnation flowers and as he has made numerous displays of equal quality, we awarded him a First Class Certificate of Merit, for superior cultivation of the Carnation.

From the May Show to the Rhododendron Show the exhibitions were of the usual excellence.

On June 1, First Class Certificates of Merit were awarded to James Comley for a Seedling Rhododendron and Thomas C. Thurlow for *Symplocos Japonica*.

RHODODENDRON SHOW.

June 6 and 7.

This, as usual, was one of our most beautiful exhibitions. The displays of Hardy Rhododendrons were particularly interesting, for they were specimens of the varieties which, with proper care, may be planted out with reasonable certainty that they will live from year to year.

Following is a list of varieties which stood the unusually severe winter of 1894–5 on the grounds of Mr. H. H. Hunnewell; also

a list of twelve hardy varieties which survived the winter on the grounds of Francis B. Hayes at Lexington.

List of varieties of Hardy Rhododendrons, which stood the winter of 1894–5, on the grounds of H. H. Hunnewell at Wellesley.

Bluebell,
Charles Thorold,
Countess of Normanton,
Duchess of Connaught,
Duchess of Sutherland,
Edward S. Rand,
F. D. Godman,
F. L. Ames,
James Mackintosh,
James Nasmyth,
J. Marshall Brooks,
John Waterer,
Kate Waterer,
Lady Grey Egerton,
Lady Rolle,
Mrs. Arthur Hunnewell,
Mrs. Heywood,
Mrs. H. Ingersoll,
Mrs. R. S. Holford,
Mrs. Shuttleworth,
Michael Waterer,
Minnie,
Neilsoni,
Princess Mary of Cambridge,
Ralph Sanders,
Silvio,
St. Simon,
The Queen.

List of twelve Hardy Rhododendrons, which stood the winter of 1894–5, on the grounds of Francis B. Hayes at Lexington, viz:

Album elegans,
Album triumphans,
Atrorubrum,
Caractacus,
Delicatissimum,
Everestianum,
H. W. Sargent,
Lady Armstrong,
Maculatum,
Oculatum nigrum,
Roseum elegans,
Roseum grandiflorum.

Herbaceous Pæonies were almost entirely absent, as this exhibition is fully a week too early for them.

Other seasonable flowers were shown in great quantities and of fine quality, conspicuous among them being the Orchids and Javan Rhododendrons from Mrs. Frederick L. Ames, the Herbaceous Plants from J. W. Manning and the Botanic Garden of Harvard University, and the displays of German Irises, Oriental Poppies, and Pelargoniums.

Mrs. Frederick L. Ames was awarded a First Class Certificate of Merit for *Aristolochia Gigas Sturtevantii*, a gigantic representative of the Dutchman's Pipe family.

ROSE SHOW.

June 20 and 21.

With the present year the manner of showing the roses was changed throughout the entire exhibition. The old wooden boxes were discarded and all flowers were shown in vases, to the manifest improvement in the appearance of the hall.

The present season was a very trying one for the rose; the unseasonably warm weather in April and the dry weather in May did them great harm and materially injured the exhibition as a whole. It was claimed by some that the deficiencies in the exhibits were occasioned by the change in the Schedule whereby all duplicates were prohibited in the different classes when competed for by one individual. This may have made some difference in the general display but when it is considered that there was but one less award made the present year to competitors in the various classes than there was last year it seems unjust to attribute all the injury to that cause.

As has been the rule for several years past the best roses came from the South Shore, principally from Hon. Joseph S. Fay of Wood's Holl. J. Eaton, Jr., of New Bedford, also contributed many fine blooms. In the class for the best single bloom of any variety, Hon. J. S. Fay took all the prizes with the following varieties in the order named, viz: Earl of Dufferin, Princess Rodocanachi, and Margaret Dickson. The first prize for a single bloom of any variety introduced since 1892, was awarded to J. Eaton, Jr., for Marchioness of Londonderry and the second to W. W. Astor, of Newport, R. I., for the same variety.

There were many interesting miscellaneous collections, the Herbaceous Plants being most prominent.

Charles J. Dawson brought from the Bussey Institution, fine flowers of the rare *Ostrowskya magnifica*, a very difficult plant to grow.

James Comley was awarded a First Class Certificate of Merit for a seedling *Rhododendron maximum*, with white flowers blotched with yellow.

On several occasions Mr. M. H. Walsh has exhibited his seedling Hybrid Rose, the Michael H. Walsh, and on July 1, 1893, he was awarded a First Class Certificate of Merit for it. The rose appeared to us to have so much promise that we deemed it expedient to see the plants growing and flowering in the open ground, and on invitation of Mr. Walsh we visited the grounds of Hon. Joseph S. Fay, his employer, on July 9, of this year, to make a further examination of the variety. The rose exceeded our most sanguine expectations, and of the great number of older varieties in Mr. Fay's collection, the cream of the European productions, there was not one to surpass this in beauty or vigor. This is the more remarkable when we take into consideration that of the hundreds of varieties of Hybrid Roses there are but two or three of any merit that are of American origin. With this fact in mind it was the unanimous opinion of the Committee that the Society should bestow upon it the highest honor within its power. We therefore awarded Mr. Walsh the Society's Gold Medal.

The exhibition of the week after the regular Rose Show has assumed considerable importance as a rose exhibition, and the roses shown are often superior to many at the regular show. This season June 29 was no exception, and we had fine displays of Hybrid Roses, *Iris Kæmpferi*, English Irises, Delphiniums, *Lilium candidum*, *Campanula Medium*, Herbaceous Plants, Native Plants, and a great variety of other seasonable flowers.

July 13 was Hollyhock day, but this has ceased to be the beautiful exhibition it was a few years ago, owing to the ravages of the hollyhock fungus, which has nearly put a stop to hollyhock growing in this region.

On this date William Robinson was awarded a Silver Medal for a seedling Sobralia named *Amesiæ*, a cross between *xantholeuca* and *Williamsii*. This is a very beautiful orchid and a credit to its originator. Mrs. Frederick L. Ames was awarded a First Class Certificate of Merit for a number of beautiful varieties of Javan Rhododendrons.

July 27 was Sweet Pea day and the displays were numerous and beautiful. Particularly valuable were the named varieties from Frederick A. Blake, A. A. Hixon, and John P. Spaulding.

August 3 was prize day for Hardy Nymphæas. The prizes were competed for by Hon. John Simpkins and Oakes Ames and

won in the order named. The collection of Mr. Simpkins was of extraordinary merit and manifested great skill in cultivation. It included several new varieties, three of which were awarded First Class Certificates of Merit; *N. Laydekeri lilacina*, an improved *Laydekeri rosea; N. Marliacea flammea*, a magnificent cup-shaped flower of about four rows of petals, which are very broad and rounded, deep lilac-carmine in color, with large yellow disk in the centre; and *N. Marliacea Robinsonia*, a very large carmine-rose colored flower with pointed petals. Mr. Simpkins was also awarded the Appleton Silver Medal for the great excellence of his exhibit.

Mrs. Frederick L. Ames was awarded a First Class Certificate of Merit for new Montbretias.

ANNUAL EXHIBITION.

September 4 and 5.

The cut flowers at this show, while making a very important part of the exhibition, were not, as a whole, so numerous as they have sometimes been. Dahlias were shown in great quantities and of fine quality. The Aquatics are always interesting and on this occasion they attracted much attention. The *Victoria regia* was much missed but the displays of Nymphæas and Nelumbiums were quite equal to any previous show of them.

First Class Certificates of Merit were awarded to J. W. Howard for a new Chrysanthemum-flowered Double Sunflower, a most remarkable form of this old plant; and to P. Bisset for a Seedling Nelumbium, deep rosy-carmine in color, grown from seed sent from Corea.

Robert Christie was awarded Honorable Mention for a collection of Seedling Cannas, and Warren W. Rawson & Co. were awarded the Society's Silver Medal for a collection of Dahlias which were well arranged, of the best quality, and exceeded in extent any previous exhibition of this flower known to us.

September 14, Oakes Ames was awarded Honorable Mention for a white Nelumbium, *N. album grandiflorum*.

CHRYSANTHEMUM SHOW.

November 5, 6, 7, and 8.

Two years ago it seemed as though the height of perfection had been reached in the cultivation of Chrysanthemums, but there has been steady improvement and the show of flowers this year eclipsed all our previous exhibitions, particularly in the size and finish of blooms. The flowers from John Simpkins and Edmund Wood & Co. were marvels in size and symmetry. It would be useless to attempt to select any special varieties from their exhibits for they were all so good.

There were very few classes that were not competed for and very few displays not in competition. As usual the greatest competition was in the classes for twenty-five flowers of twenty-five varieties, there being no less than eight competitors and only three prizes to award.

Special effort was made this year to bring the Anemone-flowered class more into notice and exhibit the strange forms peculiar to this class. The display by Hon. John Simpkins of these flowers was a remarkable one and illustrated their peculiarities in a marked manner.

Seedlings were less numerous than for several years, the most promising being the pink variety shown by E. G. Hill of Richmond, Ind., named Mrs. Perrine; the bronze-yellow variety from H. A. Gane, named West Newton, and the white variety from J. Eaton, Jr., named J. H. Woodford. First Class Certificates of Merit were awarded to T. D. Hatfield for a new seedling named Sundew, and to H. A. Gane for a new seedling Anemone-flowered, named Marcia Jones. Complimentary notice was issued to Mr. H. A. Gane for four new seedling Chrysanthemums.

Nathaniel T. Kidder, having obtained the greatest number of first prizes throughout the season for Herbaceous Plants, became entitled to the Appleton Silver Medal, and J. W. Manning to the Appleton Bronze Medal for the next greatest.

The Committee have awarded during the year one Society's Gold Medal, two Society's Silver Medals, two Appleton Silver Medals, one Appleton Bronze Medal, sixteen Certificates of Merit, two Honorable Mentions and one Complimentary Notice.

The amount appropriated for the year 1895 was	$2,500	00
Additional appropriation	200	00
	2,700	00
We have awarded in prizes and gratuities, including medals	2,660	00
Leaving an unexpended balance of	$40	00

All of which is respectfully submitted.

For the Committee,

ARTHUR H. FEWKES,
Chairman.

PRIZES AND GRATUITIES AWARDED FOR FLOWERS.

1895.

January 5.

Gratuities : —

Francis Brown Hayes, Display of Flowers	4 00
W. E. Coburn, Chinese Primulas	1 00

January 12.

Gratuities : —

Francis Brown Hayes, Camellias	4 00
David Nevins, Two bunches Marie Louise Violets	2 00
W. N. Craig, Vase of *Freesia refracta alba*	2 00
William Nicholson, Carnations	1 00
W. E. Coburn, Chinese Primulas	1 00
Mrs. E. M. Gill, Display of Flowers	2 00

January 19.

Gratuities : —

Francis Brown Hayes, Cut Flowers	4 00
Mrs. E. M. Gill, " "	1 00

January 26.

Gratuities : —

Francis Brown Hayes, Camellias	3 00
George M. Anderson, Cyclamens	1 00

February 2.

Orchids.— Display of named species and varieties, filling not less than twelve bottles, Mrs. F. L. Ames	15 00
Second, Mrs. F. L. Ames	10 00
Violets.— Best collection of varieties, fifty blooms of each in a bunch, W. N. Craig	4 00
Second, Nathaniel T. Kidder	3 00
Third, Harry S. Rand	2 00
Carnations.— Display of cut blooms, with foliage, not less than six varieties, in vases. William Nicholson	5 00
Second, W. N. Craig	4 00
Camellias.— Display of named varieties, cut flowers, with foliage, not less than twelve blooms, of not less than six varieties, Francis Brown Hayes	4 00
Second, John L. Gardner	3 00

Gratuities : —

Francis Brown Hayes, Camellias	3 00
Bussey Institution, Forced Crab Apple blossoms	3 00

Norris F. Comley, Forced Lilacs	1 00
David Nevins, Three vases of Violets	2 00
C. E. Weld, Violets	1 00
W. N. Craig, Vase of *Eucharis Amazonica*	2 00
W. E. Coburn, Chinese Primulas	1 00
C. E. Richardson, Acacia and Azaleas	1 00
Mrs. E. M. Gill, Display of Flowers	3 00
Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. P. D. Richards, Wild Flowers	1 00

February 9.

Gratuities : —

Bussey Institution, Display of Forced Shrubs and Flowers	3 00
Mrs. E. M. Gill, Cut Flowers	1 00

February 16.

Gratuities : —

Bussey Institution, Cherokee Roses	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

February 22.

Gratuities : —

Mrs. A. D. Wood, *Antirrhinum majus*	3 00
Dailledouze Brothers, Flatbush, N. Y., Mignonette	2 00
William W. Edgar, Mignonette	2 00

March 9.

Gratuities : —

David Nevins, Five vases of Hybrid Roses	5 00
James Comley, Camellias, Roses, etc.	4 00
Bussey Institution, Lilies and Rhododendrons	1 00
Harry S. Rand, Six vases of Violets	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

March 16.

Gratuities : —

James Comley, Cut Flowers	4 00
Mrs. A. D. Wood, " "	3 00

SPRING EXHIBITION.

March 26, 27, 28, and 29.

Hybrid Perpetual Roses. — Twelve cut blooms of not less than six distinct named varieties, David Nevins	8 00
Second, James Comley	6 00
Six cut blooms, distinct named varieties, James Comley	6 00
Twelve cut blooms of Ulrich Brunner, David Nevins	10 00

TENDER ROSES IN VASES.—Twelve blooms of American Beauty, Hon. John P. Spaulding 8 00
Twelve blooms of Catherine Mermet, Thomas H. Meade . . 8 00
Second, William H. Elliott 6 00
Third, Charles V. Whitten 4 00
Twelve blooms of Meteor, Charles V. Whitten 8 00
Twelve blooms of Papa Gontier, William H. Elliott . . . 8 00
Second, William H. Elliott 6 00
Twelve blooms of The Bride, William H. Elliott 8 00
Second, Charles V. Whitten 6 00
Third, Hon. John P. Spaulding 4 00
Best Tender Rose introduced since 1892, F. R. Pierson, Tarrytown, N. Y., for Bridesmaid 4 00
Second, Hon. John P. Spaulding, for Bridesmaid . . . 3 00
PANSIES.—Forty-eight cut blooms, not less than twenty-four varieties, Hon. Joseph S. Fay 4 00
Second, Hon. Joseph S. Fay 3 00
Third, Hon. Joseph S. Fay 2 00
VIOLETS.— Best bunch of fifty blooms of Czar, Harry S. Rand . 2 00
Second, Nathaniel T. Kidder 1 00
Best bunch of fifty blooms of Lady Hume Campbell, Harry S. Rand 2 00
Best bunch of fifty blooms of Marie Louise, David Nevins . . 2 00
Second, Nathaniel T. Kidder 1 00
Best bunch of fifty blooms of any other variety, Nathaniel T. Kidder, for Swanley White 2 00
Second, Nathaniel T. Kidder, for Neapolitan 1 00
CARNATIONS.—Display of cut blooms, with foliage, not less than six varieties, in vases, William Nicholson 5 00
Second, F. A. Blake 4 00
Twelve blooms of any named Crimson variety, William Nicholson, for Ferdinand Mangold 3 00
Second, Arthur H. Fewkes, for Anna Webb 2 00
Twelve blooms of any named Dark Pink variety, William Nicholson, for Nicholson 3 00
Second, F. A. Blake, for William Scott 2 00
Twelve blooms of any named Light Pink variety, Joseph H. White, for Daybreak 3 00
Second, William Nicholson, for Daybreak 2 00
Twelve blooms of any named Scarlet variety, William Nicholson, for Hector 3 00
Second, L. H. Foster, for The Stuart 2 00
Twelve blooms of any named White variety, David Nevins, for Mrs. Fisher 3 00
Second, F. A. Blake, for Lizzie McGowan 2 00
CAMELLIAS.—Display of named varieties, cut flowers with foliage, not less than twelve blooms, of not less than six varieties, John L. Gardner 4 00

Second, James Comley	3 00
Six cut blooms, of not less than four named varieties, with foliage, Joseph H. White	3 00
Centre Piece.— The last day of the Exhibition, Mrs. E. M. Gill	10 00
Second, Mrs. A. D. Wood	8 00
Bride's Bouquet.— The Second prize to Mrs. E. M. Gill	4 00

Gratuities: —

James Comley, Display of Roses	10 00
David Nevins, Hybrid Perpetual Roses	5 00
F. R. Pierson, Vases of Tea Roses, Meteor and Kaiserin Augusta	2 00
Edward Butler, Thirteen vases of Orchids	3 00
David Allan, Orchids	1 00
C. W. Ward, Collection of Carnations	5 00
Arthur H. Fewkes, Three vases of *Antirrhinum majus*	3 00
William H. Elliott, *Asparagus plumosus nanus*	3 00
James Comley, Wistaria, Rhododendrons, and Clematis	3 00
F. R. Pierson, Tarrytown, N. Y., Display of Cannas	2 00
Harry S. Rand, Eight vases of Violets	2 00
Botanic Garden, Collection of Sarracenias	2 00
Mrs. A. D. Wood, Cut Flowers	4 00
Mrs. E. M. Gill, " " etc.	3 00

April 6.

Gratuity: —

James Comley, Azaleas, Roses, etc.	4 00

April 13.

Gratuity: —

James Comley, Thirty varieties of Roses	2 00

April 20.

Gratuity: —

Mrs. E. M. Gill, Cut Flowers	1 00

April 27.

Gratuities: —

William Nicholson, Carnations	1 00
James Comley, Vase of *Magnolia stellata* and Wistaria	1 00
Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. E. M. Gill, " "	1 00

MAY EXHIBITION.

May 4.

Tulips.— Twenty-four blooms, distinct named varieties, the Second prize to John L. Gardner	4 00

HARDY NARCISSUSES. — Collection of not less than ten named varieties of blooms, in vases, John L. Gardner 6 00
Second, Bussey Institution 5 00
PANSIES. — Forty-eight cut blooms, not less than twenty-four varieties, Hon. Joseph S. Fay 4 00
Second, Hon. Joseph S. Fay 3 00
Third, Hon. Joseph S. Fay 2 00
HERBACEOUS PLANTS. — Thirty bottles, Nathaniel T. Kidder . . 8 00
NATIVE PLANTS. — Collection not exceeding thirty bottles, Mrs. P. D. Richards 5 00
Second, Miss C. M. Endicott and Miss M. C. Hewett . . 4 00
Third, Misses Eleanor and Mollie Doran 3 00

Gratuities : —

John L. Gardner, Tulips and Fritillarias 4 00
Dr. C. G. Weld, Display of Narcissuses 4 00
E. S. Converse, Gloxinias 1 00
Hon. Joseph S. Fay, Pansies 3 00
Dr. C. G. Weld, " 1 00
James Comley, Display 5 00
Mrs. E. M. Gill, Cut Flowers 3 00

MAY 11.

Gratuities : —

Hon. Joseph S. Fay, Pansies 4 00
James Comley, Display 4 00
Mrs. E. M. Gill, " 2 00
Mrs. A. D. Wood, " 2 00
Mrs. P. D. Richards, Native Plants 2 00

MAY 18.

Gratuities : —

James Comley, Display 3 00
John L. Gardner, " 2 00
Mrs. A. D. Wood, Cut Flowers 1 00
Mrs. E. M. Gill, " " 1 00
Miss C. M. Endicott and Miss M. C. Hewett, Native Plants . . 3 00
Mrs. P. D. Richards, Native Plants 3 00
Mrs. Mary E. Loud, " " 2 00

MAY 25.

TREE PÆONIES. — Three double varieties, named, three of each. John L. Gardner 3 00

Gratuities : —

James Comley, Hardy Shrubs and Cut Flowers 5 00
E. Sheppard & Son, Collection of Pelargoniums, Azaleas, etc. . 2 00

William Miller and Son, Hardy Pinks 1 00
John L. Gardner, Collection of Cut Flowers 2 00
Mrs. Mary E. Loud, Wild Flowers 3 00
Mrs. P. D. Richards, " " 2 00

JUNE 1.

Gratuities: —

H. H. Hunnewell, Collection of Rhododendrons 5 00
James Comley, Collection of Rhododendrons, Azaleas, Roses and Orchids 7 00
T. C. Thurlow, Collection of Flowering Shrubs 1 00
L. M. Chase, Snowballs, etc. 1 00
Mrs. E. M. Gill, Display 2 00
Mrs. Mary E. Loud, Native Ferns 1 00

RHODODENDRON SHOW.

JUNE 6 AND 7.

H. H. Hunnewell Fund.

RHODODENDRONS. — Twelve distinct varieties, of unquestioned hardiness, named, James Comley, a piece of plate valued at . 20 00
Second, John L. Gardner, a piece of plate valued at . . 15 00
Six distinct varieties, of unquestioned hardiness, named, Samuel J. Trepess 10 00
Second, Mrs. B. P. Cheney 5 00
Six tender varieties, named, James Comley 5 00
Three tender varieties, named, the Second prize to John L. Gardner 3 00
HARDY AZALEAS. — From any or all classes, fifteen varieties, one vase of each, James Comley 8 00
Second, Thomas C. Thurlow 5 00
Twelve varieties, one vase of each, Thomas C. Thurlow . . 4 00
Cluster of trusses, one variety, Thomas C. Thurlow . . . 2 00

Society's Prizes.

HERBACEOUS PÆONIES. — Twelve named varieties, the Third prize to John L. Gardner 6 00
GERMAN IRISES. — Six distinct varieties, one spike of each, Walter H. Cowing 3 00
Second, George Hollis 2 00
HARDY PYRETHRUMS. — Display, John L. Gardner 3 00
HARDY FLOWERING TREES AND SHRUBS. — Collection of thirty species and varieties, named, cut blooms, the Third prize to Alice Grinnell 5 00
HERBACEOUS PLANTS. — Thirty bottles, J. W. Manning . . . 8 00
BASKET OF FLOWERS. — Mrs. A. D. Wood 5 00
Second, Mrs. E. M. Gill 4 00

NATIVE PLANTS.— Collection not exceeding thirty bottles of named species and varieties, one bottle of each, Mrs. P. D. Richards . . . 5 00
Second, Miss C. M. Endicott and Miss M. C. Hewett . . . 4 00
Third, Misses Eleanor and Mollie Doran 3 00

Gratuities: —

H. H. Hunnewell, Rhododendrons and Azaleas 25 00
James Comley, Display of Rhododendrons and Azaleas 25 00
Mrs. B. P. Cheney, Display of Hardy Rhododendrons 10 00
T. C. Thurlow, Rhododendrons, Azaleas, etc. 6 00
Nathaniel T. Kidder, Rhododendrons 4 00
John L. Gardner, " 3 00
Mrs. F. L. Ames, Orchids and Javanese Rhododendrons . . . 4 00
John L. Gardner, Pæonies 2 00
James Comley, Hardy Flowering Trees and Shrubs, etc. . . 15 00
Botanic Garden of Harvard University, Display of Herbaceous Plants 10 00
I. E. Coburn, Pelargoniums 3 00
E. S. Converse, Begonias and Gloxinias 2 00
George Hollis, Display of German Irises 2 00
Walter H. Cowing, Oriental Poppies 1 00
" " Aquilegias 1 00
W. N. Craig, Display 3 00
Mrs. E. M. Gill, " 2 00

JUNE 15.

Gratuities: —

Thomas C. Thurlow, Display of Pæonies 8 00
Hon. Joseph S. Fay, " " 6 00
George Hollis, " " 3 00
Hon. Joseph S. Fay, Hybrid Roses 10 00
W. H. Cowing, Spanish Irises 1 00
C. C. Metcalf, Tulip Tree Flowers 1 00
James Comley, Display 4 00
John L. Gardner, " 3 00
Mrs. E. M. Gill, " 2 00
Mrs. A. D. Wood, Cut Flowers 1 00
Miss Alice L. Grinnell, Native Flowers 2 00

ROSE EXHIBITION.

JUNE 20 AND 21.

Special Prize, Theodore Lyman Fund.

HARDY ROSES.— Twenty-four distinct named varieties, three of each variety, Hon. Joseph S. Fay 35 00
Third, Mrs. J. W. Clark 25 00

Special Prizes, offered by the Society.

Six blooms of Alfred Colomb, Hon. Joseph S. Fay	5 00
Six blooms of Baroness Rothschild, Hon. Joseph S. Fay	5 00
Second, James Comley	4 00
Six blooms of John Hopper, Hon. Joseph S. Fay	5 00
Second, James Comley	4 00
Six blooms of Marquise de Castellane, Hon. Joseph S. Fay	5 00
Six blooms of Merveille de Lyon, Dr. C. G. Weld	5 00
Second, Hon. Joseph S. Fay	4 00
Six blooms of Mme. Gabriel Luizet, J. Eaton, Jr.	5 00
Second, Hon. Joseph S. Fay	4 00
Six blooms of Mme. Victor Verdier, Hon. Joseph S. Fay	5 00
Six blooms of Prince Camille de Rohan	5 00
Twelve blooms of any other variety, Hon. Joseph S. Fay for Magna Charta	7 00
Second, Hon. Joseph S. Fay for Gen. Jacqueminot	5 00
Third, Hon. Joseph S. Fay for Ulrich Brunner	4 00
Fourth, Sumner Coolidge for Ulrich Brunner	3 00

Regular Prizes.

Sixteen distinct named varieties, three of each variety, Hon. Joseph S. Fay	20 00
Second, J. Eaton, Jr.	15 00
Twelve distinct named varieties, three of each variety, J. Eaton, Jr.	15 00
Second, Hon. Joseph S. Fay	10 00
Six distinct named varieties, three of each variety, Hon. Joseph S. Fay	10 00
Second, Dr. C. G. Weld	8 00
Third, J. Eaton, Jr.	6 00
Three distinct named varieties, three of each, Hon. Joseph S. Fay	5 00
Second, J. Eaton, Jr.	4 00
Third, Dr. C. G. Weld	3 00
Twenty-four distinct named varieties, one of each, the Second prize to J. Eaton, Jr.	10 00
Eighteen distinct named varieties, one of each, the Second prize to Dr. C. G. Weld	8 00
Twelve distinct named varieties, one of each, the Second prize to Nathaniel T. Kidder	6 00
Best single bloom of any variety, Hon. Joseph S. Fay for Earl of Dufferin	3 00
Second, Hon. Joseph S. Fay, for Princess Rodocanachi	2 00
Third, Hon. Joseph S. Fay, for Margaret Dickson	1 00
Twelve blooms of not less than four varieties, introduced since 1892, Hon. Joseph S. Fay	10 00
Best single bloom of a variety introduced since 1892, J. Eaton, Jr., for Marchioness of Londonderry	5 00

Second, W. W. Astor, Newport, R. I., for Marchioness of Londonderry 4 00

Moss Roses.— Six distinct named varieties, three clusters of each, Hon. Joseph S. Fay 6 00

Second, Dr. C. G. Weld 4 00

Third, John L. Gardner 3 00

Hybrid Tea Roses.— Six named varieties, buds admissible, Hon. Joseph S. Fay 6 00

General Display.— One hundred bottles of Hardy Roses, buds admissible, Hon. Joseph S. Fay 10 00

Second, Mrs. E. M. Gill 9 00

Third, W. W. Astor 8 00

Fourth, James Comley 7 00

Fifth, John L. Gardner 6 00

Basket of Roses.— Arranged for effect, to be shown the second day, the Second prize to James Comley 8 00

Third, Mrs. E. M. Gill 6 00

Foxgloves.— Twelve spikes, Miss M. S. Walker 3 00

Second, John L. Gardner 2 00

Sweet Williams.— Thirty spikes, not less than six distinct varieties, Walter H. Cowing 3 00

Second, W. N. Craig 2 00

Vase of Flowers.— Best arranged, in one of the Society's glass vases, Mrs. A. D. Wood 5 00

Second, Mrs. E. M. Gill 4 00

Gratuities : —

Hon. Joseph S. Fay, Harrison Yellow Roses and Persian Yellow Roses 3 00

Hon. Joseph S. Fay, Display of Roses 30 00

J. Eaton, Jr., Roses 5 00

Mrs. J. W. Clark, Roses 2 00

Patrick Kane, " 2 00

William C. Winter, Hardy Roses 1 00

William H. Spooner, Hybrid Roses 1 00

James Comley, Display of Roses and Flowering Shrubs . . . 10 00

Miss M. S. Walker, Display of Roses, etc. 3 00

George Hollis, Pæonies and Foxgloves 1 00

O. B. Hadwen, Pæonies 1 00

Botanic Garden of Harvard University, Herbaceous Plants . . 10 00

J. W. Manning, Herbaceous Plants 4 00

W. N. Craig, Carnations and Antirrhinums 3 00

Mrs. E. M. Gill, Display of Flowers 3 00

John L. Gardner, Orchids 2 00

Thomas C. Thurlow, Flowering Trees and Shrubs . . . 2 00

Bussey Institution, *Dracunculus vulgaris* and *Ostrowskya magnifica* 1 00

Walter H. Cowing, Spanish Irises 1 00

" " Shirley Poppies 1 00

F. A. Blake, Petunias 1 00
J. W. Howard, Gloxinias 1 00
Miss M. C. Hewett and Miss C. M. Endicott, Wild Flowers . . 3 00
Mrs. P. D. Richards, Wild Flowers 2 00

June 29.

Hardy Roses.— Collection, filling fifty vases, one rose in each vase, Hon. Joseph S. Fay 20 00
Second, Hon. Joseph S. Fay 15 00
Third, Mrs. J. W. Clark 10 00
Fourth, James Comley 6 00
Iris Kæmpferi.— Fifteen varieties, three of each, in vases, John L. Gardner 6 00
Third, Thomas C. Thurlow 4 00
Six varieties, three of each, in vases, Nathaniel T. Kidder . . 4 00
English Irises.— Best collection, Walter H. Cowing . . . 3 00
Second, Frederick S. Davis 2 00
Delphiniums.— Collection of twenty spikes, John L. Gardner . 5 00
Second, Nathaniel T. Kidder 4 00
Third, Hon. Joseph S. Fay 3 00
Lilium candidum.— Twelve spikes, Miss M. S. Walker . . . 4 00
Second, Samuel Hartwell 3 00
Third, Hon. John P. Spaulding 2 00
Campanula Medium.— Collection, not less than twelve bottles, Mrs. E. M. Gill 3 00
Second, Frederick A. Blake 2 00
Herbaceous Plants.— Forty bottles, J. W. Manning . . . 8 00
Second, Shady Hill Nursery Co. 6 00
Basket of Flowers.— Mrs. A. D. Wood 5 00
Second, Mrs. E. M. Gill 4 00
Third, James Comley 3 00

Gratuities: —

Hon. Joseph S. Fay, Display of Roses 3 00
James Comley, *Iris Kæmpferi* and Roses 5 00
John L. Gardner, *Iris Kæmpferi* and Delphiniums 2 00
E. Sheppard & Son, Delphiniums and *Iris Kæmpferi* . . . 2 00
Botanic Garden of Harvard University, Display of Herbaceous Plants 10 00
Walter H. Cowing, Shirley Poppies 3 00
Walter H. Cowing, Sweet Williams 1 00
Thomas C. Thurlow, Trees and Shrubs 1 00
Frederick A. Blake, Display of Flowers 3 00
Mrs. E. M. Gill, Display 2 00
Mrs. P. D. Richards, Wild Flowers 2 00

JULY 6.

VASE OF FLOWERS.— Best arranged, in one of the Society's glass vases, Mrs. E. M. Gill 4 00
Second, Mrs. A. D. Wood 3 00
Third, Miss Hattie B. Winter 2 00
NATIVE PLANTS.— Collection, not exceeding forty bottles, Mrs. P. D. Richards 5 00
Second, Misses Eleanor and Mollie Doran 4 00
Third, Miss Alice L. Grinnell 3 00

Gratuities:—

James Comley, Hybrid Roses 2 00
J. W. Manning, Herbaceous Plants 2 00
James Comley, *Iris Kæmpferi*. 2 00
Sumner Coolidge, Hollyhocks 4 00
James Comley, " 1 00

JULY 13.

HOLLYHOCKS.— Double, twelve blooms, of twelve distinct colors. Hon. Joseph S. Fay 5 00
Second, James Comley 4 00
Third, Hon. John P. Spaulding 3 00
Six blooms, of six distinct colors, Hon. Joseph S. Fay . . 3 00
Second, James Comley 2 00
Third, E. S. Converse 1 00
Twelve spikes, Hon. John P. Spaulding 5 00
Second, James Comley 4 00
Parlor Bouquet, Mrs. A. D. Wood 4 00
Second, Mrs. E. M. Gill 3 00
Third, Miss Hattie B. Winter 2 00

Gratuities:—

Hon. John P. Spaulding, Hollyhocks 3 00
Sumner Coolidge, " 1 00
Hon. Joseph S. Fay, " 1 00
E. Sheppard & Son, " 1 00
J. W. Manning, Herbaceous Plants 5 00
Mrs. F. L. Ames, Orchids 3 00
W. N. Craig, Carnations and Sweet Peas 3 00
Ettore Tassinari, Zinnias 1 00
James Comley, Display 5 00
Mrs. P. D. Richards, Wild Flowers 2 00
Miss Alice L. Grinnell, " " 2 00

JULY 20.

GLOXINIAS.—Twelve vases, cut blooms, three in each vase, arranged with any foliage, Hon. John P. Spaulding 5 00
Second, Moses S. Stevens 4 00
TUBEROUS BEGONIAS.— Twelve vases, three in each vase, arranged with any foliage, Hon. John P. Spaulding 4 00
HARDY FERNS.— Best Display, Mrs. P. D. Richards . . . 5 00

Gratuities :—

Hon. Joseph S. Fay, Hollyhocks 10 00
Botanic Garden of Harvard University, Tuberous Begonias . . 2 00
Hon. John P. Spaulding, Gladioli 2 00
" " " Sweet Peas 1 00
E. C. Lewis, Sweet Peas 1 00
James Comley, Display 3 00
Mrs. E. M. Gill, " 1 00
Misses Eleanor and Mollie Doran, Native Flowers 3 00
Alice L. and George H. Grinnell, " " 2 00

JULY 27.

SWEET PEAS.— Display, filling thirty vases, arranged with any foliage, Hon. John P. Spaulding 6 00
Second, Frederick A. Blake 4 00
Third, Adin A. Hixon 3 00
Display of named varieties in vases, six sprays in each vase, Frederick A. Blake 4 00
Second, Adin A. Hixon 3 00
Third, Hon. John P. Spaulding 2 00
HERBACEOUS PLANTS.— Forty bottles, Nathaniel T. Kidder . . 8 00
BASKET OF FLOWERS.— For table decoration, Mrs. E. M. Gill . 5 00
Second, Miss Hattie B. Winter. 4 00

Gratuities :—

Hon. Joseph S. Fay, Roses, Sweet Peas, and Phlox 4 00
Botanic Garden of Harvard University, Herbaceous Plants . . 5 00
Hon. Joseph S. Fay, Hollyhocks 2 00
Mrs. F. L. Ames, Collection of twenty-eight varieties of Cypripediums 3 00
Hon. John P. Spaulding, Collection of Cannas 2 00
Oakes Ames, Display of Flowers 2 00
James Comley, Display 2 00
Mrs. P. D. Richards, Wild Flowers 2 00

AUGUST 3.

HARDY NYMPHÆAS.— Collection, with foliage, John Simpkins . 10 00
Second, Oakes Ames 8 00

Perennial Phloxes.— Ten distinct named varieties, one spike of each, George Hollis	5 00
Second, Thomas C. Thurlow	4 00
Third, James Comley	3 00
Vase of Flowers.— For table decoration, James Comley	5 00
Second, Mrs. E. M. Gill	4 00
Third, Miss Hattie B. Winter	3 00
Native Flowers.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, Oakes Ames	4 00
Third, Misses Eleanor and Mollie Doran	3 00

Gratuities :—

Botanic Garden of Harvard University, Collection of Phloxes	2 00
Hon. Joseph S. Fay, Hybrid Roses	2 00
Hon. John P. Spaulding, Collection of Gladioli	3 00
Botanic Garden of Harvard University, Display of Annuals	4 00
James Comley, Display of Flowers	2 00

August 10.

Gladioli.— Twenty named varieties, in spikes, J. Warren Clark	6 00
Second, James Comley	5 00
Ten named varieties, in spikes, Walter H. Cowing	3 00
Second, William E. Endicott	2 00
Six named varieties, in spikes, John Parker	2 00
Second, Walter H. Cowing	1 00
Display of named and unnamed varieties, filling one hundred vases, arranged for effect, with any foliage, Hon. John P. Spaulding	8 00
Second, William E. Endicott	6 00
Phlox Drummondi.— Thirty vases, not less than six varieties, L. W. Goodell	4 00
Second, Dr. C. G. Weld	3 00
Third, Hon. John P. Spaulding	2 00

Gratuities :—

Dr. C. G. Weld, Gladioli	2 00
William Patterson, "	1 00
Hon. John P. Spaulding, Gloxinias	2 00
Nathaniel T. Kidder, Phlox Drummondi	2 00
Aaron Lummus, Dahlias	3 00
William C. Winter, "	2 00
John Parker, Dahlias, etc.	2 00
Oakes Ames, Tank of Water Lilies	4 00
George Hollis, Phlox and Lilies	4 00
L. W. Goodell, Japan Pinks and Begonias	2 00
James Comley, Display of Cut Flowers	3 00
Mrs. E. M. Gill, Cut Flowers	1 00
Mrs. P. D. Richards, Wild Flowers	2 00

August 24.

Asters.— Large Flowered, of all classes, fifty vases, not less than twelve varieties, three flowers in each vase, Joseph H. White 5 00
Second, Hon. Joseph S. Fay 4 00
Third, Mrs. Mary T. Goddard 3 00
Truffant's Pæony Flowered, thirty blooms, not less than twelve varieties, Hon. Joseph S. Fay 5 00
Second, Nathaniel T. Kidder 4 00
Victoria Flowered, thirty blooms, not less than twelve varieties, Joseph H. White 5 00
Second, E. S. Converse 4 00
Pompon, thirty cut plants, not less than six varieties, the Second prize to Mrs. Mary T. Goddard 3 00
Herbaceous Plants.— Forty bottles, Nathaniel T. Kidder . . 8 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

September 4 and 5.

Special Prize, Theodore Lyman Fund.

Aquatic Plants.— Display, including not less than twelve flowers of Nymphæas or Nelumbiums, Hon. John Simpkins . . 30 00
Second, L. W. Goodell 20 00
Third, Oakes Ames 10 00

Regular Prizes.

Asters.— Collection of fifty flowers, one flower in each vase, preference being given to the collection containing the greatest number of classes, named, L. W. Goodell 5 00
Second, Sumner Coolidge 4 00
Dahlias.— Double, twelve blooms, distinct named varieties, L. W. Snow 6 00
Second, John Parker 5 00
Third, Lothrop Higgins 4 00
Six blooms, distinct named varieties, Lawrence H. Parker . . 4 00
Second, L. W. Snow 3 00
Third, William C. Winter 2 00
Specimen bloom, Lawrence H. Parker 2 00
Second, L. W. Snow 1 00
Liliputian, display, twenty-five bottles, not less than eight named varieties, William C. Winter 4 00
Second, Aaron Lummus 3 00
Third, William E. Endicott 2 00
Single, display of twenty-five spikes, not less than eight varieties, the Second prize to William C. Winter 3 00

Lilium lancifolium.— Collection of named varieties, Sumner Coolidge	4 00
Second, Thomas C. Thurlow	3 00
Tropæolums.— Display, filling twenty-five vases, Dr. C. G. Weld	4 00
Second, A. L. Cain	3 00
Third, E. S. Converse	2 00
Marigolds.— Display of French and African, filling twenty-five vases, Bussey Institution	3 00
Second, Oakes Ames	2 00
Cannas.— Collection of not less than ten named varieties, in spikes, with foliage, R. & J. Farquhar & Co.	10 00
Second, Walter H. Cowing	8 00
Tuberous Begonias.— Twenty-five spikes, in vases, three spikes in a vase, with foliage, not less than four varieties, Hon. John P. Spaulding	5 00
Second, Dr. C. G. Weld	4 00
Third, Albert H. Brown	3 00
Double Zinnias.— Twenty-five flowers, not less than six varieties, Dr. C. G. Weld	4 00
Second, L. W. Goodell	3 00
Third, John Jeffries	2 00
Single Dianthuses.— Collection of Annual and Biennial varieties, filling fifty bottles, L. W. Goodell	4 00
Vase of Flowers.— For table decoration, James Comley	5 00
Second, Mrs. E. M. Gill	4 00
Third, Miss Hattie B. Winter	3 00
Native Plants.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, Misses Eleanor and Mollie Doran	4 00
Third, Phillips Barry	3 00
Gratuities : —	
William C. Winter, Display of Dahlias	4 00
James S. Cowles, Newport, R. I., Display of Canna, Mrs. Fairman Rogers	2 00
L. W. Goodell, Sweet Peas and Begonias	2 00
Thomas C. Thurlow, Perennial Phloxes	1 00
James Comley, Display of Cut Flowers	2 00
Mrs. E. M. Gill, " " "	1 00

September 14.

Herbaceous Plants.— Forty bottles, Nathaniel T. Kidder	8 00
Second, J. W. Manning	6 00
Gratuity : —	
James Comley, Vase of Flowers	3 00

SEPTEMBER 21.

PERENNIAL ASTERS.— Display of Native or Introduced species and varieties, George Hollis	5 00
Second, Mrs. P D. Richards	4 00

Gratuities :—

R. & J. Farquhar & Co., Display of Cannas, Gladioli, etc.	5 00
R. & J. Farquhar & Co., Display of Annuals	2 00
Misses Eleanor and Mollie Doran, Wild Flowers	2 00

OCTOBER 2.

Gratuities :—

James Comley, *Bougainvillea glabra*	2 00
Walter H. Cowing, Display of Cannas	3 00

CHRYSANTHEMUM SHOW.

NOVEMBER 5, 6, 7, AND 8.

Special Prizes from the Josiah Bradlee Fund.

Twenty-five blooms, of twenty-five distinct varieties, named, Hon. John Simpkins, a piece of plate, or value in money	20 00
Second, Walter Hunnewell	15 00
Third, Mrs. B. P. Cheney	10 00
Six vases of six named varieties, ten blooms each, E. M. Wood & Co.	30 00
Second, C. V. Whitten	25 00

Special Prizes offered by the Society.

Best Seedling, never disseminated, three blooms, Red, J. Brydon, for Mars	5 00
Best Seedling, never disseminated, three blooms, Pink, E. G. Hill, Richmond, Ind., for Mrs. Perrine	5 00
Best Seedling, never disseminated, three blooms, White, J. Eaton, Jr., for J. H. Woodford	5 00
Best Seedling, never disseminated, three blooms, Yellow, Mann Brothers, for Theo	5 00
Best Seedling, never disseminated, three blooms, any other color, Henry A. Gane, for West Newton.	5 00

Regular Prizes.

Twelve cut blooms, Incurved, named, in vases, Joseph H. White	10 00
Twelve cut blooms, Japanese, named, in vases, Nathaniel T. Kidder	10 00
Second, Joseph H. White	6 00
Third, W. K. Wood	4 00

Twelve cut blooms, Japanese Incurved, named, in vases, Hon. John Simpkins	10 00
Second, Joseph H. White	6 00
Third, W. K. Wood	4 00
Twelve cut blooms, Anemone, named, in vases, Hon. John Simpkins	10 00
Second, James L. Little	6 00
Six cut blooms, Incurved, named, in vases, William Slack, Stamford, Conn.	6 00
Second, W. K. Wood	4 00
Third, Joseph H. White	2 00
Six cut blooms, Japanese, named, in vases, Hon. John Simpkins	6 00
Second, William Slack,	4 00
Six cut blooms, Japanese Incurved, named, in vases, E. S. Converse	6 00
Second, Mrs. B. P. Cheney	4 00
Third, James L. Little	2 00
Six cut blooms, Reflexed, named, in vases, John Simpkins	6 00
Second, Joseph H. White	4 00
Third, Mrs. B. P. Cheney	2 00
Six cut blooms, Anemone, named, in vases, J. W. Howard	6 00
Second, Dr. C. G. Weld	4 00
Third, E. S. Converse	2 00
Twelve sprays, Pompons, not less than six named varieties, the Second prize to J. W. Howard	4 00
Third, Bussey Institution	3 00
Twelve best varieties, named, introductions of the current year, Hon. John Simpkins	8 00
Second, T. D. Hatfield	6 00
Third, William Slack	4 00
Vase of blooms, on long stems, arranged in the Society's large china vases, Hon. John Simpkins	18 00
Second, Hon. John Simpkins	16 00
Third, Mrs. B. P. Cheney	14 00
Fourth, Joseph H. White	12 00
Fifth, J. W. Howard	10 00
Best vase of ten blooms, on long stems, Red, named, Edmund Wood & Co., for E. Molyneux	10 00
Second, Jeanne W. Howard, for Jeanne Delaux	8 00
Best vase of ten blooms, on long stems, Pink, named, Edmund Wood & Co., for Viviand Morel.	10 00
Second, Mrs. B. P. Cheney, for Viviand Morel	8 00
Third, Mrs. B. P. Cheney, for Inter-Ocean	6 00
Best vase of ten blooms, on long stems, White, named, Edmund Wood & Co., for Mrs. Jerome Jones	10 00
Second, Mrs. B. P. Cheney, for Mutual Friend	8 00
Best vase of ten blooms, on long stems, Yellow, named, Edmund Wood & Co., for Golden Wedding	10 00

Second, Mrs. B. P. Cheney, for Major Bonnaffon	8 00
Third, Mrs. B. P. Cheney, for H. Sunderbruch	6 00
Best vase of ten blooms, on long stems, any other color, named, Edmund Wood & Co., for Robert McInnes	10 00
Second, W. K. Wood, for Golden Hair	8 00

Gratuities: —

David Nevins, Display of Chrysanthemums	10 00
Arthur Hunnewell, Display of Chrysanthemums	5 00
William Nicholson, " " "	5 00
E. S. Converse, Collection of Chrysanthemums	5 00
James Comley, Display of Chrysanthemums	4 00
Mrs. E. M. Gill, Three vases Chrysanthemums	5 00
Hon. John Simpkins, Vase of Chrysanthemums, Pitcher & Manda	4 00
Hon. John Simpkins, Collection of Anemone Flowered Chrysanthemums	10 00
L. W. Goodell, Anemone Flowered Chrysanthemums	1 00
Mrs. E. M. Gill, Chrysanthemums	2 00
William Nicholson, Carnations	3 00
Peter Fisher, "	3 00
Oakes Ames, Nymphæas	2 00
David Allan, *Dipladenia profusa*	2 00

NOVEMBER 23.

Gratuity: —

James Comley, Display of Chrysanthemums	5 00

DECEMBER 7.

Gratuity: —

James Comley, Display of Chrysanthemums	3 00

DECEMBER 21.

Gratuity: —

James Comley, Collection of Chrysanthemums	3 00

SOCIETY'S GOLD MEDAL.

July 9. Michael H. Walsh, Seedling Hybrid Rose, Michael H. Walsh.

SOCIETY'S SILVER MEDALS.

July 13. William Robinson, Seedling Sobralia, *Sobralia Amesiæ xantholeuca × Williamsii.*

Annual Exhibition, September 4 and 5. W. W. Rawson & Co., Collection of Dahlias.

APPLETON SILVER MEDALS.

August 3. Hon. John Simpkins, Collection of Hardy Nymphæas.

September 14. Nathaniel T. Kidder, Herbaceous Plants.

APPLETON BRONZE MEDAL.

September 14. J. W. Manning, Herbaceous Plants.

FIRST CLASS CERTIFICATES OF MERIT.

March 16. Alexander McKay, Superior Cultivation of Hybrid Roses under glass.

" " Sewall Fisher, Seedling Carnation Crystal.

" " Frederick Dorner, Lafayette, Ind., Seedling Carnation Storm King.

May 4. William Nicholson, Superior Cultivation of Carnations.

June 1. James Comley, Seedling Rhododendron.

" " Thomas C. Thurlow, *Symplocos Japonica.*

Rhododendron Show, June 6, 7. Mrs. F. L. Ames, *Aristolochia Gigas Sturtevantii.*

Rose Show, June 20, 21. James Comley, Seedling *Rhododendron maximum.*

July 13. Mrs. F. L. Ames, Javanese Rhododendrons.

August 3. Mrs. F. L. Ames, New Montbretias.

August 3. Hon. John Simpkins, *Nymphæa Laydekeri lilacina.*

" " " " " " *Marliacea flammea.*

" " " " " " " *Robinsoniana.*

Annual Exhibition, September 4, 5. J. W. Howard, New Chrysanthemum-flowered Double Sunflower.

" " " " P. Bisset, Seedling Nelumbium.

Chrysanthemum Show, November 5. T. D. Hatfield, New Seedling Chrysanthemum Sundew.

" " " " Henry A. Gane, New Seedling Anemone-flowered Chrysanthemum Marcia Jones.

HONORABLE MENTIONS.

Annual Exhibition, September 4, 5. Robert Christie, Collection of Seedling Cannas.

September 14. Oakes Ames, *Nelumbium album grandiflorum.*

COMPLIMENTARY NOTICE.

Chrysanthemum Show, November 5. Henry A. Gane, Seedling Chrysanthemums.

REPORT

OF THE

COMMITTEE ON FRUITS,

FOR THE YEAR 1895.

By E. W. WOOD, Chairman.

There was less injury to fruit-bearing trees, canes, and vines during the winter of 1894–5 than the average in past years; the extremes of temperature were less, and the ground was more continuously covered with snow, some of the snow falling in November remaining on the ground until after the middle of March.

Several exceptionally warm days in early spring pushed forward the fruit buds, and being followed later by frosts, strawberries and grapes were severely injured, in many places the earlier varieties proving a total failure. The season was favorable for the growth of fruit; while the rainfall was not up to the average it was so evenly distributed that there was less injury from drought than in many of the other States.

It being the off year for Apples the exhibitions of that fruit, especially the late varieties, have not compared favorably with those of the previous years and where the trees were not properly cared for and sprayed, the fruit was so wormy and knurled as to be of little value. Of Pears there has been an average crop and some fine specimens were shown at the exhibitions. There has been little complaint of the blight among the growers the past

season and the pear continues to be less subject to injury from insect pests than most of our fruits.

The Peach crop, the past season, has been the largest for many years; the fruit buds were not so badly killed during the winter as in previous seasons, and there have been good exhibitions of this fruit. Cherries have been shown in less quantity than usual because of late frosts in some localities and rain at the time of ripening. There have been fair exhibits of Plums and the recent introduction of Japanese varieties has caused an increased interest in the cultivation of this fruit. There are several varieties of good quality that seem well adapted to our soil and climate; they are being tested and we shall ere long be able to speak more definitely of their practical value.

The fungous and insect enemies of fruit, where undisturbed, have done the usual amount of injury, but further experience seems to prove that the damage from these pests may be prevented or very much reduced by careful and systematic spraying. The tent caterpillar has not been as numerous as in recent years but the canker worm in some localities destroyed all prospects of a crop, and the ever present codling moth was as numerous as in any previous year, and as the crop of fruit was small a larger proportion than usual bore evidence of his destructive work.

There have been few new fruits shown the past year requiring special mention. The Alice grape, a white variety, from Ward D. Gunn, of Cliftondale, N. Y., was deemed of so much promise that the Committee awarded a First Class Certificate of Merit to the originator. Liberal prizes have been offered by Ex-President Strong the past two years for varieties of Strawberries not previously exhibited, but the competition has not shown anything having as many points of excellence as varieties already in general cultivation. Of recent introductions, the Mackintosh Apple is promising; it is of good quality, bright red in color, slightly below medium size, and an excellent fruit for the table. At the Annual Exhibition, October 2 and 3, William C. Clapp, of Dorchester, showed the seedling pear Harris, which was then in perfect condition. It was of medium size and excellent quality and seemed to the Committee worthy of cultivation. The Marshall Strawberry easily took the lead as an exhibition berry, and its large size, good quality, and perfect form and color recommend it for the amateur, but the plants having been sold in

limited quantities until the past season it is impossible to speak positively of its merits for field culture until the close of next season.

The Committee have awarded in premiums and gratuities $1,528, leaving an unexpended balance of $272.

E. W. Wood,
O. B. Hadwen,
C. F. Curtis,
Warren Fenno,
J. Willard Hill,
Benjamin G. Smith,
Samuel Hartwell,
Committee.

PRIZES AND GRATUITIES AWARDED FOR FRUITS, 1895.

JANUARY 12.

Gratuities :—

George McWilliam, Foreign Grapes	$3 00
Edwin A. Hall, Collection of Pears	1 00
A. H. Lewis, " " "	1 00

FEBRUARY 2.

Gratuities :—

Henry W. Wilson, Display of Tropical Fruits	5 00
A. H. Lewis, Collection of Pears	1 00
Edwin A. Hall, " " "	1 00
O. B Hadwen, " " Apples	1 00

SPRING EXHIBITION.

MARCH 26, 27, 28, AND 29.

WINTER APPLES.— Baldwin, George C. Rice	3 00
Second, J. V. Fletcher	2 00
Third, Marshall W. Chadbourne	1 00
Northern Spy, F. J. Boyden	3 00
Second, George C. Rice	2 00
Third, George V. Fletcher	1 00
Roxbury Russet, Benjamin P. Ware	3 00
Second, C. C. Boyden	2 00
Third, Littlefield Farm	1 00
Tompkins King, George C. Rice	3 00
Second, Louis J. Kendall	2 00
Third, Samuel Hartwell	1 00
Any other variety, George C. Rice, Yellow Bellflower	3 00
Second, George C. Rice, Mackintosh	2 00
Third, William Everett, Jacobs Sweet	1 00
WINTER PEARS.— Any variety, Leverett M. Chase, Anjou	3 00
Second, Leverett M. Chase, Vicar	2 00
STRAWBERRIES.— One pint, James Comley	3 00

Gratuities :—

E. M. Wight, Strawberry plants in fruit	1 00
Marshall W. Chadbourne, Maple Syrup	1 00

April 6.

Gratuity :—

James Comley, Strawberries 2 00

May 4.

Gratuities: —

Rev. Calvin Terry, Collection of Apples 1 00
Elisha S. Converse, Peaches 1 00

May 11.

Gratuity :—

William Brown, Peaches 1 00

May 18.

Gratuities: —

Benjamin P. Ware, Collection of Apples 1 00
William Brown, Peaches 1 00

May 25.

Gratuity :—

Elisha S. Converse, Nectarines 1 00

June 6.

Gratuities: —

William Doran & Son, Strawberries 2 00
William C. Winter, Peaches 1 00

July 14.

Gratuities:—

James Comley, Peaches 2 00
J. W. Howard, Marshall Strawberries 1 00

ROSE AND STRAWBERRY EXHIBITION.

June 20 and 21.

Special Prizes from the Theodore Lyman Fund.

Strawberries.— For the best four quarts of any variety, Hon. Joseph S. Fay, for Marshall, the Lyman Plate, value 20 00
Second, Sumner Coolidge, " " " " " " 16 00
Third, J. W. Howard, " " " " " " 12 00
Fourth, Warren Heustis & Son, " " " " " 10 00
Fifth, Marshall F. Ewell, " " " " " 8 00

Special Prizes Offered by the Society.

For the best two quarts of any variety, to be judged by points,
Warren Heustis & Son, Marshall 6 00
Second, Marshall F. Ewell, " 5 00
Third, George V. Fletcher, " 4 00
Fourth, I. E. Coburn, Jesse 3 00

Regular Prizes.

For the largest and best collection, not less than twenty baskets of two quarts each, and not less than five varieties, George F. Wheeler	25 00
Second, Isaac E. Coburn	20 00
Ten baskets, not less than three varieties, two quarts each, Isaac E Coburn	15 00
George V. Fletcher	12 00
Five baskets of one variety, two quarts each, Mrs. J. W. Clark, Pomfret, Conn..	8 00
Two quarts of Belmont, J. W. Howard	4 00
Second, George V. Fletcher	3 00
Third, William Doran & Son	2 00
Bubach, I. E. Coburn	4 00
Second, Sumner Coolidge	3 00
Third, Oliver R. Robbins	2 00
Champion, Wilfred Wheeler	4 00
Second, George F. Wheeler	3 00
Charles Downing, Wilfred Wheeler	4 00
Second, George F. Wheeler	3 00
Third, William Doran & Son	2 00
Crescent, the Second prize to Isaac E. Coburn	3 00
Third, William C. Winter	2 00
Cumberland, the Third prize to George F. Wheeler	2 00
Jesse, Isaac E. Coburn	4 00
Second, George V. Fletcher	3 00
Third, William C. Winter	2 00
Leader, George V. Fletcher	4 00
Second, George F. Wheeler	3 00
Marshall, Hon. Joseph S. Fay	4 00
Second, E. W. Wood	3 00
Third, Isaac E. Coburn	2 00
Miner's Prolific, the Second prize to George F. Wheeler	2 00
Sharpless, the Third prize to William Doran & Son	2 00
Any other variety, Sumner Coolidge, Hersey	4 00
Second, Isaac E. Coburn, Haverland	3 00
Third, Mrs. J. W. Clark, "	2 00
Collection of not less than six varieties, one quart of each, George V. Fletcher	8 00
Second, Isaac E. Coburn	6 00
CHERRIES.— Two quarts of any variety, George V. Fletcher	4 00
Second, Edwin Hastings	3 00
Third, Joshua C. Stone	2 00
FOREIGN GRAPES.—Two bunches of any variety, Elisha S. Converse	6 00
Second, Winter Brothers	4 00
FORCED PEACHES.— Six specimens of any variety, William C. Winter	3 00

JUNE 29.

STRAWBERRIES.— One quart of any variety, J. W. Howard	3 00
Second, Warren Heustis & Son	2 00
Third, Isaac E. Coburn	1 00
CHERRIES.— Black Tartarian, Leverett M. Chase	3 00
Second, James L. Duncan	2 00
Third, Charles B. Travis	1 00
Downer, Marshall W. Chadbourne	3 00
Any other variety, A. T. Brown, Reine Hortense	3 00
Second, Charles B. Travis, Elton	2 00
Third, Marshall W. Chadbourne, White Heart	1 00
Gratuity :—	
William Doran & Son, Raspberries	1 00

JULY 6.

CHERRIES.—Two quarts of any variety, Charles F. Curtis, Downer	3 00
Second, E. S. Chapell, Napoleon	2 00
Third, Charles F. Curtis, Hyde's Seedling	1 00
RASPBERRIES.— Two quarts of any variety, William Doran & Son, Red Antwerp	3 00
Second, Josiah W. Talbot, Seedling	2 00
CURRANTS.— Two quarts of any Red variety, W. N. Craig, Fay's	4 00
Second, William Doran & Son, Fay's	3 00
Third, " " " " Versaillaise	2 00
Two quarts of any White variety, Elisha S. Converse	3 00
Second, Samuel J. Trepess	2 00

JULY 13.

RASPBERRIES.— Collection of not less than four varieties, two quarts of each, William Doran & Son	4 00
Two quarts of any variety, Elisha S. Converse	3 00
Second, Sumner Coolidge	2 00
BLACKCAPS.— Two quarts of any variety, Hon. John P. Spaulding	2 00
CURRANTS.— One quart of Versaillaise, W. N. Craig	2 00
Second, Elisha S. Converse	1 00
One quart of any other Red variety, William C. Winter	2 00
Second, Hon. John P. Spaulding	1 00
One quart of any White variety, Elisha S. Converse	2 00
Second, Samuel J. Trepess	1 00
GOOSEBERRIES.— Two quarts of any Native variety, Joseph S. Chase, Triumph	3 00
Second, Amos Bates, Bates's Seedling	2 00
Third, E. W. Wood, " "	1 00

JULY 20.

RASPBERRIES.—Two quarts of any variety, Hon. John P. Spaulding . . . 3 00
Second, Mrs. E. J. Cutter 2 00
Third, Sumner Coolidge 1 00
CURRANTS.—One quart of any Red variety, William Doran & Son . . . 3 00
Second, W. N. Craig 2 00
Third, Elisha S. Converse 1 00
One quart of any White variety, Elisha S. Converse 2 00
GOOSEBERRIES.—Two quarts of any Foreign variety, Dr. Walter G. Kendall 3 00
Second, Benjamin P. Ware 2 00
Third, W. N. Craig 1 00

Gratuities:—

Rev. Calvin Terry, Pears 1 00
William C. Winter, Peaches 1 00

JULY 27.

BLACKBERRIES.—Two quarts of any variety, Marshall W. Chadbourne 3 00
Second, Rev. Calvin Terry 2 00
APPLES.—Tetofsky, Samuel Hartwell 3 00
Second, Marshall W. Chadbourne 2 00
PEARS.—Summer Doyenne, E. S. Converse 3 00
Second, Warren Fenno 2 00
Third, Charles N. Brackett 1 00
Any other variety, Mary Curtis, Giffard 3 00
Second, A. T. Brown, " 2 00
Third, William Milman " 1 00
PEACHES.—Any variety, Charles S. Smith 3 00
Second, Nathaniel T. Kidder 2 00

Gratuities:—

Andrew Wellington, Apricots 1 00
Mrs. Frederick L. Ames, Nectarines 2 00
William C. Winter, Peaches 1 00

AUGUST 3.

APPLES.—Red Astrachan, Samuel G. Damon 3 00
Second, Warren Fenno 2 00
Third, S. F. & F. L. Weston 1 00
Sweet Bough, Sumner Coolidge 3 00
Second, William T. Hall 2 00
Third, George V. Fletcher 1 00
Any other variety, Joshua C. Stone, Williams 3 00
Second, Sumner Coolidge, " 2 00
Third, P. G. Hanson, " 1 00

PEARS.— Giffard, Mary Curtis 3 00
Second. A. T. Brown 2 00
Third, Rufus T. Tobey 1 00
Any other variety, Sumner Coolidge, Clapp's Favorite . . . 3 00
Second, A. T. Brown 2 00
Third, Elisha S. Converse 1 00
BLACKBERRIES.— Two quarts of any variety, Marshall W. Chadbourne 3 00
Second, Rev. Calvin Terry 2 00
PEACHES.— Any variety, Mrs. N. D. Harrington, Amsden . . 3 00
Second, Charles S. Smith, Alexander 2 00
Third, Mrs. N. D. Harrington, Alexander 1 00

Gratuities: —

William Everett, Seedling Gooseberry 1 00
Mrs. Frederick L. Ames, Nectarines 1 00

AUGUST 10.

APPLES.— Oldenburg, William T. Hall 3 00
Second, J. V. Fletcher 2 00
Any other variety, Joshua C. Stone, Williams 3 00
Second, Varnum Frost " 2 00
Third, Sumner Coolidge, " 1 00
PEARS.— Clapp's Favorite, George V. Fletcher 3 00
Second, Sumner Coolidge 2 00
Third, S. Klaus 1 00
Manning's Elizabeth, Elisha S. Converse 2 00
Second, Warren Fenno 1 00
Any other variety, Sumner Coolidge, Bartlett 2 00
Second, Samuel G. Damon, " 1 00
APRICOTS.— Any variety, Andrew Wellington, Large Early . . 3 00
Second, Andrew Wellington, Alexander 2 00
PEACHES.— Any variety, Sumner Coolidge, Early Rivers . . 3 00
Second, Leverett M. Chase, Early Rivers 2 00
Third, William C. Winter, Waterloo 1 00
Six specimens of cold house or pot culture, William C. Winter . 3 00
FOREIGN GRAPES.— Two bunches of any variety, Winter Brothers, Muscat of Alexandria 5 00
Second, Winter Brothers, Black Hamburg 4 00

Gratuity: —

T. Carleton, Collection of Grapes 2 00

AUGUST 17.

APPLES.— Chenango, Samuel Hartwell 3 00
Williams, Joshua C. Stone 3 00
Second, Charles F. Curtis 2 00
Third, Varnum Frost 1 00

Any other variety, Warren Fenno, Summer Pippin	3 00
Second, Samuel G. Damon, Porter	2 00
Third, Samuel Hartwell, Bietigheimer	1 00
Pears.— Rostiezer, S. F. & F. L. Weston	3 00
Second, Marshall W. Chadbourne	2 00
Third, Charles N. Brackett	1 00
Tyson, Leverett M. Chase	3 00
Second, Clifford Weld	2 00
Third, Warren Fenno	1 00
Any other variety, A. T. Brown	3 00
Second, Sumner Coolidge	2 00
Third, Samuel G. Damon	1 00
Peaches.— Any variety, Sumner Coolidge	3 00
Second, William C. Winter	2 00
Plums.— Japanese, any variety, William C. Winter, Abundance	3 00
Second, Joseph S. Chase, Abundance	2 00
Any other variety, George V. Fletcher, Bradshaw	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, M. L. Whitney, Washington	1 00

August 24.

Apples.— Foundling, the Second prize to Warren Fenno	2 00
Gravenstein, Samuel Hartwell	3 00
Second, Joshua C. Stone	2 00
Third, Charles S. Smith	1 00
Maiden's Blush, Dr. Walter G. Kendall	3 00
Second, Joshua C. Stone	2 00
Third, Warren Fenno	1 00
Porter, Sumner Coolidge	3 00
Second, Samuel G. Damon	2 00
Third, George V. Fletcher	1 00
Summer Pippin, Warren Fenno	3 00
Second, Samuel Hartwell	2 00
Any other variety, Samuel Hartwell, Bietigheimer	3 00
Second, Joshua C. Stone, Williams	2 00
Third, Warren Fenno, Garden Royal	1 00
Pears.— Andrews, Elisha S. Converse	3 00
Second, Samuel G. Damon	2 00
Third, Joshua C. Stone	1 00
Bartlett, William Milman	3 00
Second, George V. Fletcher	2 00
Third, Samuel G. Damon	1 00
Boussock, Charles N. Brackett	3 00
Second, Charles F. Curtis	2 00
Third, Sumner Coolidge	1 00
Any other variety, A. T. Brown, Flemish Beauty	3 00
Second, Warren Fenno, Souvenir du Congrés	2 00
Third, George V. Fletcher, Clapp's Favorite	1 00

Peaches.— Single dish, of any variety, Mrs. N. D. Harrington	3 00
Second, George W. Jameson	2 00
Third, John L. Bird	1 00
Plums.—Bradshaw, Mrs. Mary T. Goddard	3 00
Second, George V. Fletcher	2 00
Third, William H. Hunt	1 00
Any other variety, Mrs. Mary T. Goddard, Washington	3 00
Second, William C. Winter, Abundance	2 00
Third, Joseph S. Chase, "	1 00
Native Grapes.— Six bunches of any variety, Samuel G. Damon, Moore's Early	3 00

August 31.

Gratuity :—

Mrs. N. D. Harrington, Peaches	1 00

September 3.

Gratuities : —

W. D. Hinds, Collection of Peaches	2 00
Mrs. J. W. Clark, Pomfret, Conn., Collection of Foreign Grapes	5 00

September 14.

Apples.— Gravenstein, Samuel Hartwell	3 00
Second, William T. Hall	2 00
Third, Charles S. Smith	1 00
Maiden's Blush, Joshua C. Stone	3 00
Second, Thomas L. Perkins	2 00
Third, Warren Fenno	1 00
Porter, George V. Fletcher	3 00
Second, Sumner Coolidge	2 00
Third, Samuel G. Damon	1 00
Any other variety, Samuel Hartwell, Stump	3 00
Second, Warren Fenno, Washington Strawberry	2 00
Third, P. G. Hanson, Mackintosh	1 00
Crab Apples.— Twenty-four specimens, Transcendent, Warren Fenno	2 00
Second, Mrs. N. D. Harrington	1 00
Any other variety, Marshall W. Chadbourne, Hyslop	2 00
Second, Joshua C. Stone, Hyslop	1 00
Pears.— Bartlett, William Milman	3 00
Second, George V. Fletcher	2 00
Third, Mrs. N. D. Harrington	1 00
Belle Lucrative, Elisha S. Converse	3 00
Second, G. L. Brown	2 00
Third, Mrs. Mary Langmaid	1 00
Boussock, Warren Fenno	3 00
Second, Charles E. Swain	2 00
Third, Charles N. Brackett	1 00

Hardy, Charles F. Curtis 3 00
Second, William S. Janvrin 2 00
Third, Warren Fenno 1 00
Paradise of Autumn, William Milman 3 00
Second, Warren Heustis & Son 2 00
Third, William H. Hunt 1 00
Souvenir du Congrés, A. T. Brown 3 00
Second, Dr. Walter G. Kendall 2 00
Third, Charles N. Brackett 1 00
Any other variety, William Milman, Seckel 3 00
Second, C. A. Jones, Louise Bonne of Jersey 2 00
Third, Warren Fenno, Pratt 1 00
PEACHES.— Crawford's Early, P. G. Hanson 3 00
Second, Samuel G. Damon 2 00
Third, Mrs. Mary T. Goddard 1 00
Foster, Mrs. Mary Langmaid 3 00
Second, Sumner Coolidge 2 00
Third, P. G. Hanson 1 00
Oldmixon Freestone, Sumner Coolidge 3 00
Second, W. D. Hinds 2 00
Third, Charles S. Smith 1 00
Stump the World, Mrs. N. D. Harrington 3 00
Second, Leverett M. Chase 2 00
Third, W. D. Hinds 1 00
Any other variety, W. D. Hinds, Crosby 3 00
Second, Mrs. N. D. Harrington, Seedling 2 00
Third, Charles S. Smith, Susquehanna 1 00
PEACHES, ORCHARD HOUSE CULTURE.— Any variety, Joseph H. White 4 00
Second, William C. Winter 3 00
NECTARINES.— Any variety of outdoor culture, C. C. Donnell . 2 00
PLUMS.— Imperial Gage, George V. Fletcher 3 00
Jefferson, Charles F. Curtis 3 00
Lombard, George V. Fletcher 3 00
Second, P. G. Hanson 2 00
Third, Samuel G. Damon 1 00
Any other variety, Mrs. Mary T. Goddard, Green Gage . . 3 00
Second, Mrs. Mary T. Goddard 2 00
Third, " " " " 1 00
NATIVE GRAPES.— August Rose, Joshua C. Stone 3 00
Second, Horace Carlton 2 00
Cottage, Benjamin G. Smith 3 00
Eumelan, " " " 3 00
Second, Samuel G. Damon 2 00
Massasoit, F. J. Kinney 3 00
Second, Samuel G. Damon 2 00

Moore's Early, Mrs. Mary T. Goddard	3 00
Second, Benjamin G. Smith	2 00
Third, Samuel G. Damon	1 00
Any other variety, F. J. Kinney, Worden	3 00
Second, Benjamin G. Smith, "	2 00
Third, Samuel G. Damon, Delaware	1 00
Any variety from girdled vines, F. J. Kinney, Worden	3 00

Gratuity : —

W. D. Hinds, Collection of Peaches	2 00

SEPTEMBER 21.

Gratuity : —

Joseph S. Chase, Collection of Grapes	3 00

ANNUAL EXHIBITION OF FRUITS AND VEGETABLES.

OCTOBER 2 AND 3.

Special Prizes.

Samuel Appleton Fund.

APPLES.— Baldwin, Sumner Coolidge	5 00
Hubbardston, Samuel Hartwell	5 00
PEARS.— Bosc, Samuel G. Damon	5 00
Sheldon, " " "	5 00

Benjamin V. French Fund.

APPLES.— Gravenstein, Samuel Hartwell	5 00
Rhode Island Greening, George V. Fletcher	5 00

Marshall P. Wilder Fund.

PEARS.— Anjou, A. T. Brown	4 00
Second, Mrs. Mary Langmaid	3 00
Third, Samuel G. Damon	2 00
Fourth, William Patterson	1 00
Bartlett, George V. Fletcher	4 00
Second, Samuel G. Damon	3 00
Third, Varnum Frost	2 00
Fourth, Samuel Lake	1 00
GRAPES.— Concord, George W. Jameson	3 00
Second, Samuel G. Damon	2 00
Worden, F. J. Kinney	3 00
Second, Benjamin G. Smith	2 00
Third, William C. Winter	1 00

Special Prizes offered by the Society.

Pears.— Anjou, Samuel W. Damon	5 00
Seckel, A. T. Brown	5 00
Peaches.— Any variety, Mrs. Mary T. Goddard	5 00
Native Grapes.— Twelve bunches of any variety, Benjamin G. Smith	5 00

Regular Prizes, Theodore Lyman Fund.

Apples.— Baldwin, Joshua C. Stone	4 00
Second, E. P. Tewksbury	3 00
Third, Sumner Coolidge	2 00
Dutch Codlin, the Second prize to Warren Fenno	1 00
Fall Orange or Holden, Samuel Hartwell	3 00
Fameuse, Joshua Coolidge	3 00
Second, William Milman	2 00
Third, Sumner Coolidge	1 00
Gloria Mundi, Samuel Hartwell	3 00
Second, Mrs. J. W. Clark	2 00
Golden Russet, H. E. Rich	2 00
Gravenstein, Samuel Hartwell	4 00
Second, William T. Hall	3 00
Third, B. N. Moore	2 00
Hubbardston, Joshua C. Stone	4 00
Second, Samuel Hartwell	3 00
Third, Marshall W. Chadbourne	2 00
Hunt Russet, E. T. Creesy	3 00
Second, Samuel Hartwell	2 00
Mackintosh, Everett Smith	3 00
Second, Samuel Hartwell	2 00
Third, C. M. Handley	1 00
Maiden's Blush, Warren Fenno	2 00
Second, T. L. Perkins	1 00
Mother, Warren Fenno	3 00
Northern Spy, George V. Fletcher	3 00
Second, Samuel G. Damon,	2 00
Third, C. M. Handley	1 00
Porter, George V. Fletcher	3 00
Second, Samuel G. Damon	2 00
Third, C. M. Handley	1 00
Pound Sweet, George V. Fletcher	3 00
Rhode Island Greening, Sumner Coolidge	4 00
Second, Joshua C. Stone	3 00
Third, Arthur F. Coolidge	2 00
Roxbury Russet, Joshua C. Stone	4 00
Second, William C. Clapp	3 00
Third, Sumner Coolidge	2 00

Sutton, the Second prize to H. E. Rich	2 00
Tompkins King, Mrs. H. A. Small	3 00
Palmer, Samuel Hartwell	3 00
Washington, Strawberry, Joshua C. Stone	2 00
Wealthy, Samuel Hartwell	3 00
Any other variety, Benjamin L. Priest, New York Pippin	3 00
Second, William Everett, Jacobs Sweet	2 00
Third, Samuel Hartwell, Yellow Bellflower	1 00
Crab Apples.— Hyslop, Joshua C. Stone	2 00
Second, Marshall W. Chadbourne	1 00
Any other variety, Samuel H. Warren	2 00

Society's Prizes.

Pears.— Angouleme, Samuel G. Damon	4 00
Second, A. T. Brown	3 00
Third, Mary Curtis	2 00
Fourth, Varnum Frost	1 00
Bosc, Richard Polson	4 00
Second, Mrs. George S. Harwood	3 00
Third, A. T. Brown	2 00
Fourth, Sumner Coolidge	1 00
Clairgeau, Samuel G. Damon	3 00
Second, Willlam T. Hall	2 00
Third, Willard P. Plimpton	1 00
Comice, A. T. Brown	3 00
Second, William Everett,	2 00
Third, Charles N. Brackett	1 00
Dana's Hovey, A. T. Brown	4 00
Second, Willard P. Plimpton	3 00
Third, Charles E. Swain	2 00
Fourth, E. W. Wood	1 00
Diel, Charles E. Swain	3 00
Second, A. T. Brown	2 00
Third, Samuel G. Damon	1 00
Fulton, Elisha S. Converse	3 00
Second, S. F. & F. L. Weston	2 00
Third, John L. Bird	1 00
Hardy, Charles F. Curtis	3 00
Second, William Milman	2 00
Third, Warren Fenno	1 00
Howell, Benjamin G. Smith	3 00
Second, Joseph C. Stone	2 00
Third, Mrs. Mary Langmaid	1 00
Josephine of Malines, Samuel G. Damon	3 00
Second, Warren Fenno	2 00
Third, John L. Bird	1 00

Lawrence, A. T. Brown	3 00
Second, Marshall W. Chadbourne	2 00
Third, William T. Hall	1 00
Louise Bonne of Jersey, Aaron S. McIntosh	3 00
Second, Thomas M. Davis	2 00
Third, John W. Martin	1 00
Marie Louise, Charles E. Swain	3 00
Second, Samuel G. Damon	2 00
Third, Sumner Coolidge	1 00
Merriam, Sumner Coolidge	3 00
Second, Samuel G. Damon	2 00
Third, Warren Heustis & Son	1 00
Onondaga, John J. Merrill	3 00
Second, Leverett M. Chase	2 00
Third, Warren Fenno	1 00
Seckel, J. McEttrick	4 00
Second, C. H. Plimpton	3 00
Third, Charles E. Swain	2 00
Fourth, A. T. Brown	1 00
Sheldon, Samuel G. Damon	4 00
Second, Mrs. N. D. Harrington	3 00
Third, Sumner Coolidge	2 00
Fourth, Mrs. Mary Langmaid	1 00
Souvenir du Congrés, A. T. Brown	3 00
Third, Marshall W. Chadbourne	1 00
St. Michael Archangel, Benjamin G. Smith	3 00
Second, Warren Heustis & Son	2 00
Third, Warren Fenno	1 00
Superfin, Sumner Coolidge	3 00
Second, Warren Fenno	2 00
Third, Samuel G. Damon	1 00
Urbaniste, Charles E. Swain	3 00
Second, Mrs. Emmons	2 00
Third, Elisha S. Converse	1 00
Vicar, A. T. Brown	3 00
Second, Elisha S. Converse	2 00
Third, Sumner Coolidge	1 00
Winter Nelis, Thomas M. Davis	3 00
Second, A. T. Brown	2 00
Third, Clifford Weld	1 00
Any other variety, William C. Clapp, Harris	3 00
Second, Warren Fenno, Pratt	2 00
Third, Elisha S. Converse, Kingsessing	1 00
Quinces.— Orange, A. F. Coolidge	3 00
Second, George V. Fletcher	2 00
Third, Mrs. Mary T. Goddard	1 00

Pear, George V. Fletcher	3 00
Second, Benjamin G. Smith	2 00
Rea, George S. Curtis	3 00
Second, Mrs. George S. Harwood	2 00
Third, Mrs. Mary T. Goddard	1 00
Any other variety, Charles S. Smith	3 00
Second, Benjamin G. Smith	2 00
Third, Charles B. Travis	1 00
PEACHES.— Crawford's Late, Francis Blake	3 00
Second, Samuel Hartwell	2 00
Third, Mrs. Mary T. Goddard	1 00
Any other variety, W. D. Hinds	3 00
Second, Sumner Coolidge	2 00
Third, Warren Heustis & Son	1 00
PEACHES, ORCHARD HOUSE CULTURE, D. B. Fearing, Newport, R. I.	4 00
PLUMS.— Coe's Golden Drop, Mrs. Mary T. Goddard	2 00
Any other variety, George V. Fletcher	2 00
NATIVE GRAPES.— Brighton, Benjamin G. Smith	3 00
Second, Marshall W. Chadbourne	2 00
Third, Mrs. Mary T. Goddard	1 00
Delaware, Joseph S. Chase	3 00
Second, Warren Fenno	2 00
Third, Benjamin G. Smith	1 00
Herbert, Joseph S. Chase	3 00
Third, Samuel G. Damon	1 00
Iona, Joseph S. Chase	3 00
Second, Samuel G. Damon	2 00
Third, Benjamin G. Smith	1 00
Lindley, Joseph S. Chase	3 00
Second, Benjamin G. Smith	2 00
Niagara, Thomas H. Talbot	3 00
Second, Benjamin G. Smith	2 00
Third, George W. Jameson	1 00
Pocklington, Samuel H. Warren	3 00
Second, M. Houghton	2 00
Third, P. G. Hanson	1 00
Prentiss, Benjamin G. Smith	3 00
Second, Joseph S. Chase	2 00
Third, Samuel G. Damon	1 00
Wilder, Benjamin, G. Smith	3 00
Worden, F. J. Kinney	3 00
Second, Benjamin G. Smith	2 00
Third, William C. Winter	1 00
Any other variety, Benjamin G. Smith	3 00
Second, Benjamin G. Smith	2 00
Third, Mrs. Mary Haller	1 00

Foreign Grapes.— Four varieties, two bunches of each, Mrs. J. W. Clark, Pomfret, Conn.,	10 00
Second, Benjamin G. Smith	8 00
Black Hamburg, two bunches, Mrs. J. W. Clark	5 00
Muscat of Alexandria, Joseph H. White	5 00
Any other variety, Mrs. J. W. Clark	5 00
Second, Elisha S. Converse	4 00
Cranberries.— Half-peck, L. J. Fosdick	3 00
Second, L. J. Fosdick	2 00
Third, " "	1 00

Gratuities :—

Mrs. J. W. Clark, Collection of Grapes	3 00
Joseph S. Chase, " " "	1 00
W. D. Hinds, " " Peaches	2 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

November 16.

Benjamin V. French Fund.

Apples.— Baldwin, Joshua C. Stone	5 00
Hubbardston, Samuel Hartwell	5 00

Society's Prizes.

Apples.— Baldwin, Samuel G. Damon	3 00
Second, Joshua C. Stone	2 00
Third, J. V. Fletcher	1 00
Fletcher Russet, Amos T. Leavitt	3 00
Hubbardston, John Parker	3 00
Second, Joshua C. Stone	2 00
Third, Samuel Hartwell	1 00
Hunt Russet, Samuel Hartwell	3 00
Second, Dr. Walter G. Kendall	2 00
Northern Spy, George V. Fletcher	3 00
Second, Samuel Hartwell	2 00
Third, William T. Hall	1 00
Rhode Island Greening, George V. Fletcher	3 00
Second, Joshua C. Stone	2 00
Third, Samuel Hartwell	1 00
Roxbury Russet, Frank M. Stone	3 00
Second, Luther Woodbury	2 00
Third, Joshua C. Stone	1 00

Any other variety, Samuel Hartwell, Mackintosh	3 00
Second, George V. Fletcher, Pound Sweet	2 00
Third, Samuel Hartwell, Gloria Mundi	1 00
Pears.—Angouleme, A. T. Brown	4 00
Second, Samuel G. Damon	3 00
Third, Mary Curtis	2 00
Fourth, Varnum Frost	1 00
Anjou, A. T. Brown	4 00
Second, Samuel G. Damon	3 00
Third, Mrs. S. Klaus	2 00
Fourth, Charles E. Swain	1 00
Clairgeau, Samuel G. Damon	3 00
Second, William T. Hall	2 00
Third, Joshua C. Stone	1 00
Comice, A. T. Brown	4 00
Second, William Everett	3 00
Third, S. F. & F. L. Weston	2 00
Fourth, Samuel G. Damon	1 00
Dana's Hovey, A. T. Brown	4 00
Second, Samuel G. Damon	3 00
Third, Charles E. Swain	2 00
Fourth, George V. Fletcher	1 00
Diel, Samuel G. Damon	3 00
Second, A. T. Brown	2 00
Third, Charles E. Swain	1 00
Glout Morceau, Mary Curtis	3 00
Second, Warren Fenno	2 00
Third, Clifford Weld	1 00
Josephine of Malines, Samuel G. Damon	3 00
Second, Warren Fenno	2 00
Third, John L. Bird	1 00
Langelier, Thomas M. Davis	3 00
Second, A. T. Brown	2 00
Third, Mrs. S. Klaus	1 00
Lawrence, A. T. Brown	3 00
Second, Mrs. Emmons	2 00
Third, Mrs. A. A. Johnson	1 00
Vicar, A. T. Brown	3 00
Second, John J. Merrill	2 00
Third, Elisha S. Converse	1 00
Winter Nelis, Thomas M. Davis	3 00
Second, A. T. Brown	2 00
Third, Mrs. Emmons	1 00
Any other variety, Samuel G. Damon, Sheldon	3 00
Second, A. T. Brown, Bosc	2 00
Third, Charles E. Swain, Seckel	1 00

Foreign Grapes. — Two bunches of any variety, Elisha S. Converse, Gros Colman	4 00
Second, Elisha S. Converse, Alicante	3 00
Gratuities: —	
Samuel G. Damon, Collection of Pears	5 00
L. J. Fosdick, Cranberries	2 00

SOCIETY'S SILVER MEDAL.

September 3. Mrs. J. W. Clark, Pomfret, Conn., Golden Hamburg Grapes.

FIRST CLASS CERTIFICATE OF MERIT.

Annual Exhibition of Fruits and Vegetables, October 2 and 3. Ward D. Gunn, Cliftondale, N.Y., Alice Grapes.

REPORT

OF THE

COMMITTEE ON VEGETABLES,

FOR THE YEAR 1895.

By CHARLES N. BRACKETT, Chairman.

The exhibitions of vegetables during the past year, taking the season as a whole, have been of unusual excellence. For beauty, evenness, and smoothness of growth, it was the generally expressed opinion that the specimens shown have rarely if ever been excelled at any of our former exhibitions.

Competition for the prizes has been more active and close than in any former year within the memory of the present Committee. There has also been a large increase in the number of contributors.

On nearly every Saturday from January to November, whether it has been prize day or not, choice specimens of vegetables either from the forcing house or open ground have been on exhibition, thereby adding to the interest in our weekly shows.

The constant and increasing interest manifested by contributors and the public generally, in this department of our exhibitions, has been duly appreciated by your Committee, and should be highly gratifying to the Society at large.

The opening Prize Exhibition of the year was that for Forced Vegetables, January 12, at which time there were shown specimens of Rhubarb, Radishes, Cucumbers, Lettuce, Mushrooms, Parsley, and Tomatoes, all of which were of superior quality and growth.

From this time to the Annual Exhibition our weekly shows have been such as not only to attract and gratify visitors, but also to

reflect credit upon contributors and the Society. From year to year marks of improvement are visible, and give evidence of a constantly growing and continued progress on the part of the cultivator.

On May 4, the first Asparagus of the season was shown by Varnum Frost, who secured the first prize. Fine specimens were also exhibited on the following prize day by P. G. Hanson and Hon. George Heywood, who were awarded prizes in the order named.

Peas were shown for the first time June 15, F. C. Goddard being the exhibitor. From this date on through the season peas were shown in liberal quantity and variety. The leading kinds were American Wonder, Advancer, Stratagem, Heroine, and Champion. A new and very handsome pea belonging to the same class as the Heroine and Stratagem was shown by Samuel J. Trepess, and was much admired. It was called Juno.

With many growers the Heroine is taking the place of the Stratagem on account of the difficulty of procuring pure seed of that variety, which of late appears to be badly mixed and unreliable. It is to be regretted that so fine a pea should be allowed to run out for want of care in the selection and growing of stock seed.

Tomatoes of outdoor culture were shown for the first time July 13, Joshua C. Stone being awarded the first prize for the Boston Market. Fine specimens of May's Favorite and Paragon were shown on the same date.

The cultivation and development of the different varieties of the Tomato may be said to have approached, if not to have reached, perfection. In form, quality, or size there appears to be little to be desired. If any further improvement is possible it would seem to be in the way of earliness, but we doubt whether much more can be gained in that direction. The experience of the past ten or more years shows that we have about reached the limit.

A new feature, and one in which the visiting public appears to be deeply interested at the present time, has been the introduction at our weekly shows of large collections of our Native Mushrooms, both edible and noxious. The larger portion of the Mushroom family are said to be wholesome and nutritious, but because of the prevailing ignorance in regard to them, deaths from eating those which are poisonous are of not infrequent occurrence, so that great care and experience are requisite to discriminate those

which can be eaten with safety. It is useless to tell an ignorant person how to distinguish a poisonous from a wholesome mushroom. This knowledge can be safely gained only by learning from those who know. Until such knowledge is acquired we can only advise the masses to eat nothing but the one which everybody is supposed to have learned to be the good Mushroom, *(Agaricus campestris)* and the only one which is generally grown artificially.

The largest exhibition of Native Mushrooms was made at the weekly show, July 27. The contributors were Hollis Webster, Annie M. Livsey of Crompton, R. I., Joseph H. Woodford, and William C. Bates. The collection of Mr. Webster was a very extensive one, comprising a large number of named specimens both edible and noxious. On August 10, Charles E. Richardson showed a good collection, and Ellen N. Rumrill another October 19.

In view of the interest manifested both by members of the Society and visitors, in acquiring a better knowledge of our Native Mushrooms, it has been thought advisable to offer prizes the coming year for the best collection of named Edible Native Mushrooms. For further information those interested are referred to the Schedule of Prizes for 1896.

At the Annual Exhibition were to be seen a fine collection of vegetables of all the best varieties, giving proof of the highest cultivation, and displayed in tempting profusion.

The show of Potatoes at this time was the largest and best the Society has ever made. There were one hundred and six dishes in all and not a really poor one among the lot. The first prize for the best four varieties was awarded to C. H. Thomas of New Hampshire. His specimens were splendidly grown and much admired.

The show of Tomatoes at this exhibition was equally fine and full,—one of the best ever made so late in the season. The whole number of dishes was eighty-seven. Hon. Aaron Low was the largest contributor, showing some twenty varieties. The first prize for the best three varieties was awarded to Varnum Frost.

At this exhibition we were indebted to William J. Martin, gardener to Nathaniel T. Kidder, for a large collection comprising upwards of sixty varieties of well-grown vegetables, tastefully arranged and forming an interesting feature of the show.

The show of Cauliflowers, Celery, and Squashes was also unusually fine, the exhibits of Cauliflowers by A. M. Knowlton, William H. Teele, and B. J. Souza, and of Celery by Warren Heustis & Son and Arthur F. Coolidge being particularly worthy of mention.

During the past exhibition season more of the prizes offered in the Schedule have been competed for and taken than in any previous year, the full amount appropriated for Vegetables having been awarded.

The attention of contributors is called to changes and alterations in the Schedule of Prizes for the coming year.

All of which is respectfully submitted,

For the Committee,

C. N. Brackett,

Chairman.

PRIZES AND GRATUITIES AWARDED FOR VEGETABLES.

January 5.

Gratuities:—

Francis Brown Hayes, Celery $1 00
Norris Comley, Rhubarb 1 00

January 12.

Radishes.— Four bunches of any variety, Joshua C. Stone . . 3 00
Second, Warren Heustis & Son 2 00
Third, Charles A. Learned 1 00
Cucumbers.— Pair of any variety, John L. Gardner . . . 3 00
Lettuce.— Four heads of Tennisball, H. R. Kinney . . . 2 00
Second, W. N. Craig 1 00
Parsley.— Two quarts, H. R. Kinney 3 00
Second, W. N. Craig, Matchless 2 00
Third, W. N. Craig, Emerald 1 00
Mushrooms.— Twenty-four specimens, George M. Anderson . . 3 00
Tomatoes.— Twelve specimens, Winter Brothers, Essex . . 3 00
Second, W. N. Craig, Chemin 2 00
Third, Winter Brothers, President Cleveland 1 00

Gratuities:—

Warren Heustis & Son, Celery 2 00
Francis Brown Hayes, " 1 00
Norris Comley, Rhubarb 1 00

January 19.

Gratuity:—

Norris Comley, Rhubarb 1 00

February 2.

Radishes.— Four bunches of any variety, Joshua C. Stone . . 3 00
Third, W. N. Craig 1 00
Cucumbers.— Pair of any variety, John L. Gardner . . . 3 00
Lettuce.— Four heads of Tennisball, the Second prize to Joshua C. Stone 3 00
Rhubarb.— Twelve stalks, Norris Comley 3 00
Second, C. F. Smith 2 00
Third, George Sanderson 1 00
Tomatoes.— Twelve specimens, Winter Brothers, Chemin . . 3 00
Second, W. N. Craig 2 00
Third, Winter Brothers, Essex 1 00

Gratuities : —

Warren Heustis & Son, Celery	1 00
William Miller, Mushrooms	1 00

FEBRUARY 16.

Gratuity : —

Warren Heustis & Son, Celery	1 00

FEBRUARY 23.

Gratuities : —

Warren Heustis & Son, Celery	1 00
Herbert F. Calder, Rhubarb	1 00
Charles A. Learned, Lettuce	1 00

MARCH 2.

Gratuity : —

Warren Heustis & Son, Celery	1 00

MARCH 9.

Gratuities : —

David Nevins, Cauliflowers	1 00
Samuel J. Trepess, Lettuce	1 00

MARCH 16.

Gratuity : —

John Lyons, Lettuce	1 00

SPRING EXHIBITION.

MARCH 26, 27, 28, AND 29.

William J. Walker Fund.

RADISHES.— Four bunches of Turnip Rooted, H. R. Kinney	3 00
Second, Joshua C. Stone	2 00
Four bunches of Long Scarlet, H. R. Kinney	3 00
Second, William C. Winter	2 00
Third, John L. Bird	1 00
CELERY.— Four roots, Warren Heustis & Son, Perle le Grand	3 00
Second, Warren Heustis & Son, Boston Market	2 00
LETTUCE.— Four heads of Tennisball, H. R. Kinney	3 00
Second, Charles A. Learned	2 00
Third, Nathaniel T. Kidder	1 00
PARSLEY.— Two quarts, H. R. Kinney	2 00
Second, George Sanderson	1 00
MUSHROOMS.— Twenty-four specimens, Mrs. E. M. Gill	3 00

Rhubarb.— Twelve stalks, Norris Comley 3 00
Second, George Sanderson 2 00
Tomatoes.— Twelve specimens, Winter Brothers, Chemin . . 3 00
Second, Winter Brothers, Essex 2 00

Gratuities : —

David Nevins, Celery 1 00
" " Mushrooms 1 00
" " Cauliflowers 1 00
John L. Gardner, Cucumbers 1 00
Charles A. Learned, Beets 1 00
Warren Heustis & Son, Collection 1 00

April 6.

Cucumbers.— Pair of White Spine, Charles Cummings . . . 3 00
Mushrooms.— Twenty-four specimens, the Second prize to Mrs. E. M. Gill 2 00

Gratuity : —

Warren Heustis & Son, Radishes 1 00

April 13.

Gratuity : —

Warren Heustis & Son, Radishes 1 00

April 20.

Gratuity : —

Warren Heustis & Son, Dandelions 1 00

MAY EXHIBITION.

May 4.

Asparagus.— Four bunches, Varnum Frost 3 00
Cucumbers.— Pair of White Spine, Varnum Frost 3 00
Second, Walter Russell 2 00
Third, Charles Cummings 1 00
Any other variety, the Third prize to John L. Gardner . . 1 00
Spinach.— Peck, Warren Heustis & Son 3 00
Dandelions.— Peck, Varnum Frost 2 00
Second, Warren Heustis & Son 1 00
Lettuce.— Four heads, John L. Gardner 3 00
Rhubarb.— Twelve stalks, Varnum Frost 3 00
Second, P. G. Hanson 2 00
Third, Warren Heustis & Son 1 00

Gratuities : —

Varnum Frost, Cucumbers	1 00
John L. Gardner, Lettuce	1 00
W. N. Craig, Tomatoes and Parsley	3 00
Walter Russell, Radishes	1 00
Warren Heustis & Son, Radishes	1 00
Mrs. Mary T. Goddard, Collection	2 00

MAY 11.

Gratuities : —

P. G. Hanson, Asparagus and Rhubarb	2 00
Hon. George Heywood, Asparagus	1 00
Walter Russell, Cucumbers and Radishes	1 00
Warren Heustis & Son, Collection	2 00

MAY 18.

Gratuities : —

Mrs. Mary T. Goddard, Beets and Carrots	2 00
Warren Heustis & Son, Radishes	1 00
Hon. George Heywood, Asparagus	1 00
W. N. Craig, Collection of Tomatoes, etc.	3 00
Walter Russell, Collection	2 00

MAY 25.

Gratuities : —

W. N. Craig, Cucumbers and Tomatoes	2 00
John L. Gardner, Cabbages and Cucumbers	2 00
George Heywood, Asparagus	1 00
Warren Heustis & Son, Collection	3 00
Walter Russell, "	3 00

JUNE 1.

Gratuities : —

John L. Gardner, Cauliflowers	1 00
Warren Heustis & Son, Collection	2 00
P. G. Hanson, "	2 00
Walter Russell, "	1 00

RHODODENDRON SHOW.

JUNE 6 AND 7.

BEETS.— Twelve specimens, Mrs. Mary T. Goddard	3 00
Second, Joshua C. Stone	2 00
CARROTS.— Twelve Short Scarlet, W. N. Craig	3 00
Second, Warren Heustis & Son	2 00
Third, Mrs. Mary T. Goddard	1 00

Radishes.— Four bunches of Turnip Rooted, Walter Russell	3 00
Second, Warren Heustis & Son	2 00
Third, Walter Russell	1 00
Four bunches of Long Scarlet, Warren Heustis & Son	3 00
Asparagus.— Four bunches, P. G. Hanson	3 00
Second, Hon. George Heywood	2 00
Third, J. Fuller	1 00
Cucumbers.— Pair, grown under glass, Warren Heustis & Son	3 00
Second, Charles Cummings	2 00
Third, Walter Russell	1 00
Lettuce.— Four heads, Joshua C. Stone	3 00
Second, Sumner Coolidge	2 00
Third, George Winn	1 00
Rhubarb.— Twelve stalks, P. G. Hanson	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Samuel J. Trepess	1 00
Tomatoes.— Twelve specimens, W. N. Craig	3 00
Second, Moses Stevens, Nicholson's Hybrid	2 00
Third, " " May's Favorite	1 00

Gratuities: —

Warren Heustis & Son, Collection	3 00
John L. Gardner, "	3 00
W. N. Craig, "	2 00
Walter Russell, "	2 00
H. R. Kinney, "	2 00

June 15.

Gratuities: —

John L. Gardner, Cauliflowers and Peas	2 00
F. E. Goddard, Stratagem Peas	1 00
Hon. Joseph S. Fay, Collection	4 00
Walter Russell, "	3 00
Warren Heustis & Son, "	3 00

ROSE AND STRAWBERRY SHOW.

June 20 and 21.

Beets.— Twelve Summer Turnip Rooted, Warren Heustis & Son	$3 00
Second, Sumner Coolidge	2 00
Third, Joshua C. Stone	1 00
Onions.— Twelve specimens, Walter Russell	3 00
Second, Sumner Coolidge	2 00
Third, Warren Heustis & Son	1 00

Cucumbers.— Pair of White Spine, Warren Heustis & Son	3 00
Second. Charles A. Learned	2 00
Third, Walter Russell	1 00
Any other variety, W. N. Craig	3 00
Cabbages.— Three of any variety, trimmed, Hon. Joseph S. Fay	3 00
Third, Warren Heustis & Son	1 00
Lettuce.— Four heads of any variety, Sumner Coolidge	3 00
Second, Warren Heustis & Son	2 00
Third, E. C. Lewis	1 00
Peas.— Half-peck of any variety, P. G. Hanson	3 00
Second, Hon. Joseph S. Fay	2 00
Third, Charles A. Learned	1 00

Gratuities :—

Hon. Joseph S. Fay, Cauliflowers	1 00
W. N. Craig, Collection of Tomatoes	2 00
Winter Brothers " "	1 00
Sumner Coolidge, Collection	2 00
P. G. Hanson, "	1 00
Warren Heustis & Son, Collection	1 00

June 29.

Potatoes.— Twelve specimens, Hon. Joseph S. Fay, Hebron	3 00
Second, Hon. Joseph S. Fay, New Queen	2 00
Third, Hon. Joseph S. Fay, Early Rose	1 00
Onions.— Twelve specimens, Sumner Coolidge	2 00
Second, Hon. Joseph S. Fay	1 00
Squashes.— Four Long Warted, Joshua C. Stone	2 00
Second, Sumner Coolidge	1 00
Four Scalloped, Sumner Coolidge	2 00
Second, Joshua C. Stone	1 00
Cabbages.— Three of any variety, trimmed, Hon. Joseph S. Fay, Wakefield	3 00
Second, Hon. Joseph S. Fay, Wyman	2 00
Third, Warren Heustis & Son, All Seasons	1 00
Peas.— Half-peck of American Wonder, Hon. Joseph S. Fay	3 00
Any other variety, Isaac E. Coburn, Advance	3 00
Second, Hon. Joseph S. Fay	2 00
Third, Joshua C. Stone	1 00

Gratuities :—

John P. Spaulding, Beans	1 00
Warren Heustis & Son, Collection	2 00
Sumner Coolidge, "	2 00
Walter Russell "	1 00

JULY 6.

SQUASHES.— Four Long Warted, Sumner Coolidge	2 00
Second, Walter Russell	1 00
BEANS.— Half-peck of String, of any variety, Joshua C. Stone, Cranberry	3 00
Second, Warren Heustis & Son, Cranberry	2 00
Third, Sumner Coolidge, Hybrid	1 00
PEAS.— Half-peck of Stratagem, John P. Spaulding	3 00
Half-peck of any other variety, Isaac E. Coburn	3 00
Second, Hon. Aaron Low	2 00

Gratuities : —

W. N. Craig, Tomatoes	2 00
Moses Stevens, "	1 00
Samuel J. Trepess, Tomatoes	1 00
Warren Heustis & Son, Collection	2 00
Sumner Coolidge, "	2 00
Walter Russell, "	1 00

JULY 13.

CABBAGES.— Three Drumhead, trimmed, Warren Heustis & Son, All Seasons	3 00
Second, Warren Heustis & Son, Johnson's No. 2	2 00
BEANS.— Half-peck of Cranberry, Joshua C. Stone	3 00
Second, Warren Heustis & Son	2 00
Third, Sumner Coolidge	1 00
PEAS.— Half-peck of any variety, Isaac E. Coburn, Heroine	3 00
Second, Samuel J. Trepess, Juno	2 00
Third, Isaac E. Coburn, Advancer	1 00
SWEET CORN.— Twelve ears, Sumner Coolidge, Hybrid	3 00
Second, Sumner Coolidge, Corey	2 00
Third, Joshua C. Stone, "	1 00
TOMATOES.— Open culture, twelve specimens, Joshua C. Stone, Boston Market	3 00
Second, Samuel J. Trepess, Paragon	2 00
Third, Samuel J. Trepess, May's Favorite	1 00

Gratuities : —

Walter Russell, Cucumbers	1 00
Sumner Coolidge, Collection	3 00
Warren Heustis & Son, "	2 00
W. N. Craig, "	1 00

JULY 20.

POTATOES.— Twelve specimens, Hon. Joseph S. Fay, Rose,	3 00
Second, Hon. Joseph S. Fay, Hebron	2 00
Third, Hon. Joseph S. Fay, Savoy	1 00

Lettuce.— Four heads of any variety, Warren Heustis & Son	3 00
Second, Sumner Coolidge	2 00
Third, George F. Stone	1 00
Sweet Corn.— Twelve ears, Sumner Coolidge, Hybrid	3 00
Second, Sumner Coolidge, Corey	2 00
Third, Joshua C. Stone, "	1 00
Tomatoes.— Open culture, twelve specimens, Joshua C. Stone, Boston Market	3 00
Second, Samuel J. Trepess, Acme	2 00
Third, W. N. Craig	1 00
Gratuities : —	
Walter Russell, Cucumbers	1 00
Elias Sprague, Celery	2 00
Nathaniel T. Kidder, Tomatoes	1 00
Hon. Joseph S. Fay, Collection of Potatoes	1 00
Warren Heustis & Son, Collection	2 00
Sumner Coolidge, "	2 00

July 27.

Potatoes.— Any variety, twelve specimens, Hon. Joseph S. Fay, Rose	3 00
Second, Hon. Joseph S. Fay, Hebron	2 00
Third, Isaac E. Coburn, "	1 00
Squashes.— Three Marrow, Joshua C. Stone	3 00
Second, Sumner Coolidge	2 00
Peas.— Half-peck of any variety, C. H. Goddard, Stratagem	3 00
Second, Isaac E. Coburn, Heroine	2 00
Third, Hon. Aaron Low, Stratagem	1 00
Sweet Corn.— Twelve ears of Crosby, Sumner Coolidge	3 00
Second, Joshua C. Stone	2 00
Twelve ears of any other variety, Sumner Coolidge, Hybrid	3 00
Second, Joshua C. Stone, Hybrid	2 00
Third, Joshua C. Stone, Corey	1 00
Tomatoes.— Twelve specimens, Joshua C. Stone, Comrade	3 00
Second, Winter Brothers, President Cleveland	2 00
Third, Isaac E. Coburn, Comrade	1 00
Gratuities : —	
Warren Heustis & Son, Cabbages	1 00
Sumner Coolidge, Collection	2 00
E. C. Lewis, "	2 00
W. N. Craig, "	1 00
Isaac E. Coburn, "	1 00
Walter Russell, "	1 00
Hollis Webster, " of Fungi	5 00
Joseph H. Woodford, " " "	3 00
Annie M. Livsey, " " "	2 00
William C. Bates, " " "	2 00

August 3.

Beans.— Two quarts of Goddard, shelled, Rev. Calvin Terry	3 00
Half-peck of Horticultural, Joshua C. Stone	3 00
Second, Sumner Coolidge	2 00
Third, Sumner Coolidge, King	1 00
Tomatoes.— Twelve specimens of Acme, Samuel J. Trepess	3 00
Twelve specimens of Comrade, Isaac E. Coburn	3 00
Second, Joshua C. Stone	2 00
Twelve specimens of any other variety, Isaac E. Coburn. Stone	3 00
Second, E. N. Pierce, Lorillard	2 00
Third, Isaac E. Coburn, Atlantic Prize	1 00
Egg Plant.— Four specimens of Round Purple, Joshua C. Stone	3 00
Second, Sumner Coolidge	2 00

Gratuities: —

Joshua C. Stone, Egg Plants	1 00
Hon. John P. Spaulding, Cauliflower	1 00
C. H. Goddard, Stratagem Peas	1 00
W. N. Craig, Collection	2 00
Sumner Coolidge, "	1 00
Warren Heustis & Son, Collection	1 00

August 10.

Sweet Corn.— Twelve ears, Sumner Coolidge, Potter's Excelsior	3 00
Second, Oliver R. Robbins, Honey Dew	2 00
Third, Sumner Coolidge, Fottler's Early	1 00
Egg Plant.— Four specimens of Round Purple, Sumner Coolidge	2 00
Second, Joshua C. Stone	1 00

Gratuities: —

Samuel J. Trepess, Tomatoes	1 00
James Comley, Cucumbers	1 00
Warren Heustis & Son, Collection	2 00
Sumner Coolidge, "	1 00
Charles E. Richardson, Fungi	2 00
William C. Bates, "	1 00

August 17.

Potatoes.— Twelve specimens of any variety, Hon. Joseph S. Fay, Hebron	3 00
Second, Samuel Hartwell, Hebron	2 00
Third, Isaac E. Coburn, Rose	1 00
Onions.— Twelve specimens, W. N. Craig	3 00
Second, Sumner Coolidge	2 00
Third, Warren Heustis & Son	1 00

GREENFLESH MELONS.— Four specimens, Isaac E. Coburn . . 3 00
Second, Samuel Hartwell 2 00
Third, C. L. Marshall 1 00
BEANS. — Two quarts of Large Lima, Sumner Coolidge . . . 3 00
Second, Hon. John P. Spaulding 2 00
Two quarts of Goddard, Oliver R. Robbins 3 00
Second, Rev. Calvin Terry 2 00
Third, Samuel Hartwell 1 00
SWEET CORN.— Twelve ears of Potter's Excelsior, Mrs. Mary T. Goddard 3 00
Second, Charles B. Lancaster 2 00
Third, Hon. Aaron Low 1 00
Twelve ears of any other variety, Sumner Coolidge, Stowell's . 3 00
Second, Hon. Joseph S. Fay, Stowell's 2 00
Third, Oliver R. Robbins, Honey Dew 1 00
PEPPERS.—Twelve specimens of Squash, P. G. Hanson . . . 3 00
Second, Joshua C. Stone. 2 00
Third, E. C. Lewis 1 00
Any other variety, Nathaniel T. Kidder, Ruby King . . . 3 00
Second, E. C. Lewis, " " . . . 2 00
Third, Hon. Joseph S. Fay, " " . . . 1 00
CELERY.—Four roots of any variety, Warren Heustis & Son . . 3 00
Second, Varnum Frost 2 00
Third, W. N. Craig 1 00

Gratuities : —

Walter Russell. Collection 3 00
W. N. Craig, " 3 00
E. C. Lewis, " 3 00
Nathaniel T. Kidder, " 2 00

AUGUST 24.

CABBAGES.—Three of any variety, trimmed, Joshua C. Stone . . 3 00
CAULIFLOWERS.—Four specimens, A. M. Knowlton 3 00
CELERY.—Four roots, Varnum Frost 3 00
Second, Warren Heustis & Son 2 00
BEANS.—Two quarts of Large Lima, Sumner Coolidge . . . 3 00
Two quarts of Dwarf Lima, Hon. John P. Spaulding . . . 3 00
Second, Isaac E. Coburn 2 00
MARTYNIAS.—Twelve specimens, Marshall W. Chadbourne . . 2 00
Second, Nathaniel T. Kidder 1 00
PEPPERS.—Twelve specimens of Squash, P. G. Hanson . . . 3 00
Second, George W. Jameson 2 00
Third, Joshua C. Stone, ... 1 00
Any other variety, Nathaniel T. Kidder, Ruby King . . . 3 00

Gratuities : —

Isaac E. Coburn, Collection of six varieties of Tomatoes	3 00
Varnum Frost, Tomatoes	1 00
W. N. Craig, Collection	3 00
A. S. Coffin, Collection of Fungi	2 00
William C. Bates " "	1 00

SEPTEMBER 7.

Gratuity : —

Warren Heustis & Son, Celery	2 00

SEPTEMBER 14.

GREENFLESH MELONS.—Four specimens, E. C. Lewis	3 00
Second, Sumner Coolidge,	2 00
Third, Warren Heustis & Son,	1 00
SALMON FLESH MELONS.—Four specimens, Hon. Aaron Low	3 00
Second, Hon. Aaron Low, Christiana	2 00
Third, Hon. Aaron Low, Emerald Gem	1 00
WATERMELONS.—Two specimens, Rev. Calvin Terry	3 00
Second, Sumner Coolidge, Phinney's	2 00
Third, Sumner Coolidge, Ferry's Hybrid	1 00
CAULIFLOWERS.—Four specimens, A. M. Knowlton	3 00
Second, B. J. De Souza	2 00
Third, Joshua C. Stone	1 00
LETTUCE.—Four heads of any variety, E. C. Lewis, Defiance	3 00
Second, Sumner Coolidge	2 00
Third, E. C. Lewis, Sutton's Favorite	1 00
CELERY.—Four roots of any variety, Arthur F. Coolidge	3 00
Second, Warren Heustis & Son	2 00
PARSLEY.—Two quarts, Sumner Coolidge	2 00
Second, Mrs. Mary T. Goddard	1 00
BEANS.—Two quarts of Large Lima, Varnum Frost	3 00
Second, Sumner Coolidge	2 00
Third, Mrs. Mary T. Goddard	1 00
CORN, SWEET.—Twelve ears of Potter's Excelsior, Charles B. Lancaster	3 00
Second, Sumner Coolidge,	2 00
Third, P. G. Hanson	1 00
Any other sweet variety, Oliver R. Robbins, Hickock	3 00
Second, P. G. Hanson, Quincy Market	2 00
Third, Arthur F. Coolidge, Stowell's	1 00
EGG PLANT.—Four Round Purple, Sumner Coolidge	3 00
Second, Arthur F. Coolidge,	2 00
Third, Joshua C. Stone	1 00
TOMATOES.—Three varieties, twelve specimens each, Varnum Frost,	5 00
Second, Hon. Aaron Low	4 00
Third, W. N. Craig	3 00

Twelve Acme, Hon. Aaron Low	3 00
Second, Samuel J. Trepess	2 00
Third, Mrs. Mary T. Goddard	1 00
Twelve Comrade, Varnum Frost	3 00
Second, Isaac E. Coburn	2 00
Third, Hon. Aaron Low	1 00
Twelve Ignotum, Isaac E. Coburn	3 00
Second, Mrs. Mary T. Goddard	2 00
Twelve May's Favorite, Varnum Frost	3 00
Second, Nathaniel T. Kidder	2 00
Third, Hon. Aaron Low	1 00
Twelve Paragon, Varnum Frost	3 00
Second, P. G. Hanson	2 00
Third, Samuel J. Trepess	1 00
Twelve of any other variety, Varnum Frost, Stone	3 00
Second, Isaac E. Coburn, Stone	2 00
Third, P. G. Hanson, Stone	1 00
Martynias.—Twelve specimens, Marshall W. Chadbourne	2 00
Second, Nathaniel T. Kidder	1 00
Okra.—Twelve specimens, Nathaniel T. Kidder	3 00
Second, Nathaniel T. Kidder, Dwarf	2 00
Third, Warren Heustis & Son	1 00
Peppers.—Twelve specimens of Squash, P. G. Hanson	3 00
Second, George W. Jameson	2 00
Third, Joshua C. Stone	1 00
Any other variety, Nathaniel T. Kidder, Bull Nose	3 00
Second, Hon. Aaron Low, " "	2 00
Third, Nathaniel T. Kidder, Ruby King	1 00

Gratuities:

Hon. Aaron Low, Collection of ten varieties of Tomatoes	3 00
C. E. Lewis, Collection	5 00
W. N. Craig, "	3 00
Walter Russell, "	1 00
P. G. Hanson, "	1 00

September 21.

Gratuities:—

Warren Heustis & Son, Celery	2 00
Ettore Tassinari, Onions	1 00
Daniel T. Curtis, Cucumbers	1 00

ANNUAL EXHIBITION OF FRUITS AND VEGETABLES.

October 2 and 3.

Special Prizes.

Cauliflowers.— Best four specimens, and best kept during the exhibition, William H. Teele 5 00
Second, A. M. Knowlton 4 00
Celery.— Best four specimens, and kept best during the exhibition, Warren Heustis & Son 8 00
Second, Arthur F. Coolidge 6 00

Regular Prizes.

Beets.— Twelve Turnip Rooted, Varnum Frost. . . . 3 00
Second, Warren Heustis & Son 2 00
Third, H. R. Kinney 1 00
Carrots.— Twelve Long Orange, H. R. Kinney . . 3 00
Twelve Intermediate, H. R. Kinney 3 00
Second, Henry E. Rich 2 00
Third, Warren Heustis & Son 1 00
Parsnips.— Twelve Long, H. R. Kinney 3 00
Second, E. C. Lewis 2 00
Third, Mrs. J. W. Clark 1 00
Potatoes.— Four varieties, twelve specimens each, C. H. Thomas 5 00
Second, Mrs. Mary T. Goddard 4 00
Third, Isaac E. Coburn 3 00
Clark, Twelve specimens, Samuel Hartwell 3 00
Second, Mrs. Mary T. Goddard 2 00
Third, Isaac E. Coburn 1 00
Hebron, Isaac E. Coburn 3 00
Second, W. F. Wilder 2 00
Third, H. R. Kinney 1 00
Rose, Isaac E. Coburn 3 00
Second, B. J. De Souza 2 00
Third, Mrs. Mary T. Goddard 1 00
Savoy, Samuel Hartwell 3 00
Second, Hon. Aaron Low 2 00
Third, H. R. Kinney 1 00
Any other variety, C. H. Thomas, Rural New Yorker . . 3 00
Second, W. F. Wilder, Monroe County Prize 2 00
Third, H. R. Kinney, Potentate 1 00
Salsify.— Twelve specimens, Nathaniel T. Kidder . . . 3 00
Second, E. C. Lewis 2 00
Third, Samuel J. Trepess 1 00

Turnips.— Twelve Flat, F. J. Kinney	2 00
Second, Henry E. Rich	1 00
Swedish, B. J. De Souza	2 00
Second, H. R. Kinney	1 00
Onions.— Twelve Danvers, Ettore Tassinari	3 00
Second, William O'Connell	2 00
Third, Varnum Frost	1 00
Red, William O'Connell	3 00
Second, W. N. Craig	2 00
Third, Nathaniel T. Kidder	1 00
White, William O'Connell	3 00
Second, Walter Russell	2 00
Squashes.— Three Bay State, Sumner Coolidge	3 00
Second, Hon. Aaron Low	2 00
Third, Charles B. Lancaster	1 00
Hubbard, Arthur F. Coolidge	3 00
Second, Sumner Coolidge	2 00
Third, E. C. Lewis	1 00
Hybrid Turban, Hon. Aaron Low	3 00
Second, Joshua C. Stone	2 00
Third, E. C. Lewis	1 00
Marblehead, E. C. Lewis	3 00
Marrow, Sumner Coolidge	3 00
Second, Varnum Frost	2 00
Third, Arthur F. Coolidge	1 00
Brussels Sprouts.— Half-peck, E. C. Lewis	3 00
Second, Richard T. Lombard	2 00
Third, W. N. Craig	1 00
Cabbages.— Three Drumhead, trimmed, Charles B. Lancaster	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Samuel Hartwell	1 00
Red, trimmed, Mrs. George S. Harwood	3 00
Second, H. R. Kinney	2 00
Third, Charles B. Lancaster	1 00
Savoy, trimmed, Joshua C. Stone	3 00
Second, Samuel J. Trepess	2 00
Third, Samuel Hartwell	1 00
Cauliflowers.— Four specimens, William H. Teele	3 00
Second, A. M. Knowlton	2 00
Third, B. J. De Souza	1 00
Celery.— Paris Golden, four roots, best kept, Arthur F. Coolidge	4 00
Second, Warren Heustis & Son	3 00
Third, Varnum Frost	2 00
Any other variety, H. R. Kinney, Giant Pascal	4 00
Second, Warren Heustis & Son, " "	3 00
Third, Mrs. J. W. Clark, Pomfret, Conn., White Plume	2 00

ENDIVE.— Four specimens, H. R. Kinney 3 00
Second, Sumner Coolidge 2 00
Third, Mrs. Mary Haller 1 00
LETTUCE.— Four heads, Sumner Coolidge 3 00
Second, Warren Heustis & Son 2 00
Third, Joshua C. Stone 1 00
PARSLEY.— Two quarts, Mrs. Mary T. Goddard 3 00
Second, Arthur F. Coolidge 2 00
Third, Sumner Coolidge 1 00
HORSERADISH.— Six Roots, H. R. Kinney 3 00
CORN.— Yellow, or Field, twenty-five ears, traced, William H. Cowen 3 00
Second, William H. Cowen, eight rowed 2 00
Third, Thomas H. Perkins 1 00
EGG PLANT.— Four Round Purple, Arthur F. Coolidge . . . 3 00
Second, Sumner Coolidge 2 00
Third, Mrs. J. W. Clark 1 00
TOMATOES.— Three varieties, twelve specimens each, Varnum Frost 5 00
Second, Hon. Aaron Low 4 00
Third, " " " 3 00
Acme, twelve specimens, Hon. Aaron Low 3 00
Second, Samuel J Trepess 2 00
Third, Henry E. Rich 1 00
Comrade, P. G. Hanson 3 00
Second, Varnum Frost 2 00
Third, Hon. Aaron Low 1 00
May's Favorite, Hon. Aaron Low 3 00
Second, W. N. Craig 2 00
Third, Varnum Frost 1 00
Paragon, P. G. Hanson 3 00
Second, Hon. Aaron Low 2 00
Third, Oliver R. Robbins 1 00
Any other variety, Samuel J. Trepess, Ignotum 3 00
Second, Isaac E. Coburn, Stone 2 00
Third, P. G. Hanson, President Cleveland 1 00
PEPPERS.— Twelve specimens of Squash, P. G. Hanson . . . 3 00
Second, George W. Jameson 2 00
Third, Joshua C. Stone 1 00
Any other variety, George W. Jameson, Ruby King . . . 3 00
Second, Nathaniel T. Kidder, Bull Nose 2 00
Third, Mrs. J. W. Clark, " " 1 00

Gratuities : —

Hon. Aaron Low, Thirteen varieties of Potatoes 3 00
E. C. Lewis, Watermelons 1 00
Samuel Hartwell, Melons 1 00
Henry E. Rich, Beans 1 00

Samuel Hartwell, Lima Beans		1 00
Warren Heustis & Son, Collection of Celery		3 00
Hon. Aaron Low, " " Tomatoes		3 00
Isaac E. Coburn, " " "		2 00
Nathaniel T. Kidder, " " Sixty Varieties		10 00
H. R. Kinney, "		4 00
W. N. Craig, "		3 00
E. C. Lewis, "		3 00
Varnum Frost, "		3 00
Walter Russell, "		3 00
Warren Heustis & Son, "		2 00
Ettore Tassinari, "		1 00

October 12.

Gratuities : —

Warren Heustis & Son, Celery	1 00
Patrick Melia, Squash	1 00

October 19.

Gratuities : —

Warren Heustis & Son, Celery	1 00
Ellen N. Rumrill, Native Mushrooms	1 00

November 5.

Gratuity : —

George M. Anderson, Mushrooms	1 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

November 16.

Cucumbers.— Francis Blake, White Spine	3 00
Second, H. R. Kinney, " "	2 00
Third, John L. Gardner, Telegraph	1 00
Cabbages.— Three Red, trimmed, Charles B. Lancaster	3 00
Second, Mrs. Mary T. Goddard	2 00
Three Savoy, George Sanderson	3 00
Second, Joshua C. Stone	2 00
Brussels Sprouts.— Half-peck, Nathaniel T. Kidder	3 00
Second, W. N. Craig	2 00
Cauliflowers.—Four specimens, A. M. Knowlton	3 00
Second, William H. Teele	2 00
Third, B. J. De Souza	1 00
Celery.— Four roots, Warren Heustis & Son, Paris Golden	3 00
Second, H. R. Kinney, Paris Golden	2 00
Third, Warren Heustis & Son, Giant Pascal	1 00

Lettuce.— Four heads, Arthur F. Coolidge	3 00
Second, Joshua C. Stone	2 00
Third, Nathaniel T. Kidder	1 00
Tomatoes.— Twelve specimens, William C. Winter, Chemin	3 00
Second, William C. Winter, Early Essex	2 00
Third, " " " President Cleveland	1 00
Gratuity: —	
Francis Blake, Collection	2 00

FIRST CLASS CERTIFICATE OF MERIT.

November 30. A. W. Crockford, for superior cultivation of Mushrooms.

REPORT

OF THE

COMMITTEE ON GARDENS,

FOR THE YEAR 1895.

By JOHN G. BARKER, Chairman.

The season of 1895 has not differed in many respects from those that have preceded. For the H. H. Hunnewell Triennial Premium no application has been made, but we are glad to report that we already have an application for 1896, and another one is confidently expected. For the best arranged and best kept Flower Garden, named Hardy Perennial and Biennial Plants admissible, although we should naturally think that this prize would draw attention from those who have flower gardens, in many years not more than one application has been received. No application was received for the Rose House. Some changes have been made in the Schedule, which we trust may attract the attention of the various growers.

We find it impossible to arrange a Schedule that will include all that we should like to offer prizes for. But this fact need not deter anyone from calling the attention of the Committee to any object he may have worthy of inspection.

During the season of 1895 we have made nine visits, and we trust that the account presented of each one will be sufficient evidence to the Society of the continued usefulness of the Garden Committee.

Mr. S. C. Pratt's Strawberry Garden, Reading.

Mr. Pratt having made his entry for the best Fruit Garden, the Committee made their visit on the 18th of June. We found that he devoted about fifteen acres to the cultivation of Strawberries, and we were informed that his business is more for the sale of plants than fruit. A complete system of irrigation is in use, which of course is indispensable. About one ton of fertilizer is used to each acre, the chemicals being obtained from a reliable source, Mr. Pratt doing his own mixing, using 1,500 pounds of dissolved Bone Black and 500 pounds of high-grade Sulphate of Potash, costing about $22. A bed is fruited but one season, and first-class fruit is obtained. Mr. Pratt says that his experience with fruiting an old bed has not been satisfactory; the berries are second class and give the grower a poor reputation.

The first fruit picked for the market was June 15, from Beder Wood; the last picking was on the 10th of July, from Beverly, Timbrell, and Fountain. Two acres were fruited that were grown in the narrow row system, for fruit only, Beverly and Barton's Eclipse yielding 20,000 baskets of first-class fruit. Mr. Pratt says: "I am satisfied that with such a yield it pays to raise the fruit at six cents a quart," and that he received twice that at wholesale.

J. W. Manning's Herbaceous Garden, Reading.

On the same day the Committee enjoyed a very profitable visit at the grounds of Mr. Manning, especially in looking over the collection of Herbaceous Plants and some new shrubs of merit. Those who are attendants at the weekly exhibitions have admired and profited by the exhibits of Mr. Manning, and we desire to record our satisfaction at the care bestowed upon his plants, not only in cultivation but in keeping them true to name. No garden is complete today without the hardy bed, for there is nothing that the landscape gardener can use that will give greater satisfaction.

Mr. Manning writes us as follows:

Reading, Mass., Jan. 21, 1896.

Mr. John G. Barker, Chairman of Committee on Gardens:

Dear Sir:— Agreeably to your request I take pleasure in giving you some notes upon the Hardy Perennials and other plants that your Committee viewed at the Reading Nursery last September.

At Reading we labor under considerable difficulty in the matter of soil, which is quite generally a very light loam, devoid of any traces of clay, but with an excessive preponderance of gravel at times; consequently in many cases we find it quite out of the question to attempt the raising of certain classes of nursery stock which are better grown on a clay soil. For this reason large blocks of Pears, Plums, and Cherries are not to be seen with us. On the other hand for the raising of many sorts of Hardy Herbaceous plants and most of the Shrubs, our soil is exceptionally well adapted.

Among new Hardy Shrubs we find the following of the greatest promise and worthy of extended culture:

Stephanandra flexuosa, of Japanese origin, forms a densely branched shrub with deeply toothed foliage, of a rich glossy green, taking on unusual tints of reddish purple in its young growth and again at its autumn ripening. The branches are long and slender, densely clothed with branchlets, and the white flowers, though minute, are borne in such profusion as to give considerable effect. A plant that clothes itself well to the ground even with age,— a feature of itself.

Rubus deliciosus, the Rocky Mountain Bramble, is very hardy with us and of neat habit of growth, with foliage of a pleasing light green, and a wealth of rich white flowers in June and July; each an inch and a half across, giving the effect of single roses.

Caryopteris Mastacanthus, the so-called Blue Spiraea, is proving of great interest, with its dense whorls of rich deep blue flowers in late September, continuing till frost. Much after the habit of the Desmodium, this probably will kill back nearly if not quite to the ground yearly, but will not kill out completely unless present indications and reports are decidedly wrong. We are indebted to China for this acquisition.

Hypericum Moserianum, with its rich foliage and elegant large golden flowers in great profusion, is of highest merit but the matter of a good winter covering of leaves must not be overlooked.

Double Lilacs and the new single forms, of which there is such a confusing variety, at present show remarkable improvements, and cannot fail to add greatly to our early summer shrubbery effects. I note among the best the following:

Philemon.— Rich wine red; perhaps the deepest colored of all the single or double sorts.

Comte Horace de Choiseul.— Double, deep reddish purple.

Chinensis alba.— A dwarf form, with pure white starry flowers with distinct lilac eye.

Trainoniana.— Rich blue; very prolific.

Louis Spaeth.— Deepest reddish purple.

Spiraea arguta.— A new Japanese species, among the earliest and best of new Spiraeas.

Daphne Genkwa.— A deciduous species from Japan, with dense clusters of small intensely fragrant, lilac flowers. It can be highly recommended.

Berberis ilicifolia, the Holly-leaved Barberry is a stronger grower than the Mahonia; not quite so evergreen but with a rich purple shading of foliage in the younger growth and a deep clear green with age. Seemingly quite hardy, this gives great promise.

Colutea purpurea is a notable improvement in flower over the old form of the Bladder Senna; more prolific and richly colored.

Viburnum tomentosum cannot be too highly recommended as a large growing shrub. Its great profusion of showy flat cymes of pure white flowers are well set off by its rich foliage.

Among the newer variegated foliaged shrubs, *Cornus alba* var. *Spaeth*, with rich shading of green and gold; the Golden Hop Tree (*Ptelea trifoliata* var. *aurea*); the Variegated Syringa or Mock Orange, with handsome marbling of silver and green; and the Variegated *Hypericum Moserianum*, with shades of green, gold, and flesh color, are all notably good additions.

In trees the most remarkable good new things that we have tested are the Van Houtte's Golden Elm, with beautiful golden foliage having a charming metallic luster in the full sun, and Dampier's Golden Elm, nearly if not quite as good,— both varieties of the English Elm; the Weeping Purple Beech, a grand thing with good weeping tendencies and a particularly rich purple coloring of foliage; the Tricolor Beech, having the foliage handsomely variegated with shades of purple and red; Teas's Weeping Mulberry, and Bunge's Catalpa; this last forming a dense globe of large and showy foliage, and on specimens grafted on a good standard stem forming a particularly desirable tree for lawn use.

Our collection of Hardy Herbaceous Perennials, of which we feel that we have a very fair one, embracing as it does something over two thousand varieties at the present time, with a discardure after careful testing during the last ten years of perhaps one-half

as many more, has given us food for much thought as to their possibilities in the near future. We are well aware that our soil, with its light nature admits the cultivation of many sorts that in a more retentive soil would probably prove less hardy, but leaving aside the possibly tender sorts it is a pleasure to note the following newer kinds as perfectly hardy with us under the severest trials that we can give them, and consequently such as we would recommend for further trial in other soils:

Achillea Eupatorium, the Noble Yarrow, with a constant succession of broad flat heads of clear lemon yellow.

Aconitum autumnale, the latest blooming of all Monkshoods.

A. Napellus var. *bicolor*, with tall spikes of blue and white.

Æthionema grandiflora, a charming evergreen, with dense heads of rich pale purple.

Ajuga Genevensis, of dense growth, completely enveloped in showy clusters of the richest blue in early summer.

Alstrœmeria aurantiaca has clusters of showy, lily-like, yellow flowers, handsomely streaked with purple.

Anemone sylvestris has pure white flowers in early summer.

Aquilegia vulgaris var. *alba* (Munstead White), with purest white flowers, is one of the most satisfactory of the Columbines, without the objectionable dying-out habit of this class.

Arabis albida var. *variegata*.—Foliage beautifully variegated with gold and green.

Armeria maritima var. *Lauchiana*, a beautiful form of the Thrift, with dark green foliage, dense tufted habit, and a nearly constant succession of rich deep crimson flowers. An elegant edging plant, which might well supersede the dwarf box.

Arnebia echioides, the Prophet flower, with dense clusters of rich yellow flowers, curiously spotted with fading purple.

Asperula odorata, the Maitrank of the German nation, forming a dense carpet of green with intensely fragrant clusters of minute pure white flowers.

Of Hardy Bamboos, the following seem to be quite reliable: *Bambusa falcata*, *B. Metake*, *B. Ragamowski*, *B. Simonii*, *B. striata* and *B. viminalis*, all particularly graceful in their leaf effects.

Callirhoe involucrata, the Poppy Mallow, is nearly always in bloom and its rich crimson flowers are particularly showy on the vines in early morning.

Campanula Van Houtteii can never be omitted from a list of really good things. Its flowering effect is simply marvellous in well established clumps.

Centaurea montana and its different varieties, particularly the pure white form, are choice for cutting and are continuous bloomers.

Delphinium Chinensis.—These are too little known and should be extolled to the utmost, producing as they do an almost constant succession of loose open panicles of beautiful flowers in the most exquisite shades of blue, lavender, and white, in many cases oddly spotted with deeper shades. For cutting purposes these should never be omitted from the flower garden.

Desmodium penduliflorum, classed either as herbaceous or a shrub, is especially desirable for its wealth of bloom just in advance of frosty weather.

Doronicum plantagineum var. *excelsum* is among the finest of spring flowers, with a wealth of rich golden yellow aster-like flowers.

Elymus glaucus is a particularly showy grass, with rich silvery foliage, and soon forms a fine clump.

The Epimediums are among my choicest favorites, with their elegant showy foliage, so odd in shape and so handsomely colored in its young growth, and the showy panicles of flowers are noteworthy among spring-blooming perennials; *E. alpinum*, with red and white starry flowers; *E. sulphureum*, pure yellow; *E. niveum*, pure white; and *E. macranthum*, with pale mauve purple Orchid-like flowers, are among the choicest of this genus.

Eulalia gracillima is a particularly showy grass with long, slender, white-ribbed leaves, the whole plant producing a vase like effect.

Glaucium Fischeri has particularly showy silvery foliage and a good supply of orange colored flowers.

Globularia tricosantha, with its tufted habit and dense heads of blue, is desirable for any well drained spot.

Gypsophila repens forms a densely branched carpet of foliage, handsomely set with clusters of small white flowers tinged with pink.

G. Steveni is an improvement over the old Chalk Plant in its dwarfer habit and more continuous blooming, and is earlier as well.

Helenium Hoopesii is the choicest of the Sneezeworts, forming immense candelabra like heads of rich golden yellow flowers.

Of the Helianthemums much could be said; all are evergreen, forming dense carpets of foliage, and in midsummer thickly studded with yellow flowers like minute roses in the species *angustifolia*, *croceum*, and *vulgare*, while *H. hyssopifolium* gives us copper colored and *H. rhodanthemum* bright red flowers.

In the Sunflowers, *Helianthus mollis* has glaucous, velvety foliage and handsomely formed lemon yellow flowers; *H. lætiflorus*, with rich orange semi-double flowers on long clean wiry stems, is particularly to be recommended for cutting purposes.

Hemerocallis Thunbergii is a welcome addition to the Yellow Day-lilies, coming into bloom in July and bearing rich lemon yellow flowers, of a mild but charming fragrance.

H. aurantiaca major is being tested and we have much hope from it.

H. Dumortierii and *H. Middendorfiana* are two orange yellow species of recent introduction and both can be recommended.

Heuchera sanguinea is perfectly hardy, and would be desirable for its handsomely mottled foliage alone, while the addition of its rich scarlet vermilion flowers, in dense long stemmed clusters, renders it quite unique among the good new things.

Lupinus polyphyllus in its clear blue, pure white, and variegated blue and white forms, is a first-class border plant.

Omphalodes verna and its pure white form, both known as Creeping Forget-me-nots, thrive admirably with us and form dense carpets of broad foliage with clusters of blue and white or white flowers.

Papaver pilosum, a species of Poppy from Bothnia, with salmon colored flowers, is in almost constant bloom.

Polemonium humile or *Richardsonii* is among the best of the Jacob's Ladders, having clusters of large pure blue flowers with a most charming odor.

The hybrid Potentillas or Cinquefoils are perfectly hardy, increase rapidly and give a wealth of bloom in midsummer. The coloring of the semi-double forms is remarkably rich in shades of yellow, orange, purple, and crimson. In their season these are among the choicest of garden plants.

In Primulas I have found a source of delight and surprise. *P. denticulata*, *P. vulgaris* in all its forms, *P. officinalis*, *P. corta-*

soides, *P. Sieboldii*, and *P. Japonica* do well, and some other sorts can with little care be safely wintered. Those noted thrive without any covering being necessary, and I have been surprised that the old-fashioned Polyanthus has not been more freely planted than it is. Nothing is more charming than a good edging of primulas, and in the open border, when planted singly or in clusters, they always command attention to the exclusion of other flowers in spite of the great wealth of bloom that we have in spring. The forms of *Primula Sieboldii* are all welcome additions and as soon as well known will be extensively planted.

There continues a great improvement in the Hybrid Pyrethrums and many deep shades of yellow and copper are appearing among the newer double sorts. In light soils we find these perennials first class in every way.

Scabiosa Caucasica is one of the most desirable plants in the entire collection, producing a profusion of large showy lavender flowers, each on a good stem for cutting. There is a shade of color in this flower quite beyond description, which is particularly beautiful. For cutting purposes this is invaluable.

Silene Virginica, the Fire Pink, I have no difficulty in growing, and this can be particularly noted as one of the most brilliant flowers that we have; a dazzling cardinal.

In Spiraeas the *palmata* section is coming rapidly to the front as well they may, their sturdy habit of growth and showy spikes of rich red rendering them among the best of their class.

Solidago rigida is the most satisfactory of the Golden-rods, producing heavy trusses of rich golden yellow flowers. This is less weedy than most sorts and altogether is very satisfactory.

The Silver Thyme is quite hardy with us and forms a neat carpet plant, with particularly showy silver and green variegated foliage.

Tricyrtis hirta, the Toad Lily, is among the most curious plants we have, giving a remarkable amount of bloom just in advance of hard frost in most grotesquely formed and colored flowers.

Among the Veronicas or Speedwells I must not fail to mention the following as quite indispensable: *V. amethystina*, a dense bushy plant with innumerable clusters of deepest amethyst blue; *V. longifolia* var. *subsessilis*, with long spikes of richest blue in late summer and continuing nearly to frost; *V. rupestris*, forming

a dense low carpet of evergreen verdure quite hidden in spring with its clouds of bright blue flowers; *V. incana* with its silvery foliage, setting off so well its upright spikes of lavender purple, and *V. pectinata*, with grayish woolly foliage and deep blue spikes.

The above represent to a certain extent the less well-known sorts of hardy perennials; the list is only partially complete, yet possibly is as long as should be given to occupy the room of the report.

JACOB W. MANNING.

MRS. J. W. CLARK'S ESTATE, POMFRET, CONN.

On the 20th of August the Committee visited this estate, the special object being to inspect the vinery, from which for several seasons very fine fruit has been shown at the exhibitions by Mrs. Clark. The account given by Mr. John Ash, the successful gardener, will be read with interest and profit. The vinery gave evidence in every way of skillful cultivation, showing at this time some very fine fruit. Other objects of special interest might be mentioned, but at some future time a more extended report of the grounds will probably be given. It may, however, not be out of place to say now that the entire grounds were in excellent condition, having all the requirements of a first class private place. The vegetable garden was especially noticeable, its arrangement being very orderly, and with a large succession of all the standard varieties of vegetables in great abundance. The farm was quite a feature, with a large barn for storing hay and keeping the horses and cattle, all in excellent condition, and giving evidence of good management and reflecting much credit on Mr. Ash who has the direction of the entire estate.

Mr. Ash's account of his method of cultivation is as follows:

I would say, with regard to my mode of cultivating grapes that it is very simple. I start my grapery about Febuary 15th, at a temperature of from 43° to 48° of artificial heat, allowing the sun heat to run it up to from 80° to 85° with moderate ventilation, keeping the house at these temperatures until the buds show signs of swelling, when I raise the artificial heat to 55°, night temperature, with a day temperature of 60°. I keep the house at this heat until the vines have made a growth of about three inches, when

I again raise the temperature to from 60° to 65°, night, and from 65° to 70°, day. When starting my house I give the border a thorough soaking with water heated to 85°, repeating the operation once about two weeks before the vines are in bloom, at which time I keep the atmosphere in the house moderately dry, ventilating freely on bright days and only damping the floor about midday. This treatment is followed until the fruit is set, when I put on a top-dressing of barnyard manure and give the border a thorough watering with tepid water, repeating as often as is required. Just when the grapes commence to take their second swell, I give a copious watering with liquid manure and another similar dose just before the grapes begin coloring. After this I use only clear water, and when the grapes are ripe I keep the border as dry as possible without allowing the vines to suffer. My grapery is 50×20 ft.

The extent of this estate is one hundred acres; we have about six acres of lawn and flower garden, and about four acres of vegetable garden. We grow almost everything in the vegetable line. Besides the grapery we have a Palm house 50×20; Rose house 50×18; one house for general greenhouse flowering plants, 50×18, and a house for Carnations and Violets 100×10. The greenhouses are heated by hot water (overhead system), using two Foster boilers connected so that we can use either separately or in conjunction with each other.

W. D. Hinds's Peach Orchard.

For the best Fruit Garden an application was received from Mr. W. D. Hinds of Townsend to examine his orchard of Crosby Peaches. Not since 1881 have your Committee had an opportunity to inspect a Peach orchard; at that time we visited those of John B. Moore and Marshall Miles of Concord, and Thomas C. Thurlow of West Newbury. Those who were there remember what success these cultivators had achieved. Since then we began to think that the days of Peach cultivation in Massachusetts had ended, but this visit to Mr. Hinds quickly dispelled all such thoughts. We have endeavored to obtain all the good points we could on peach culture, and we venture a few extracts in regard to the subject. The revised edition of A. J. Downing's "Fruits and Fruit Trees of America," 1869, says, "Thousands of acres are devoted to this crop for the supply of the markets of our

large cities. . . . Many growers have orchards of from 10,000 to 100,000 trees of different ages, and send to market in good seasons as many bushels of fruit from the bearing trees."

The following extract is as important now as it was when written twenty-seven years ago.

"The very great facility with which the peach grows in this country, and the numerous crops it produces, almost without care, have led to a carelessness of cultivation which has greatly enfeebled the stock, and, as we shall presently show, has in many places produced a disease peculiar to this country. This renders it necessary to give some additional care and attention to the cultivation of the peach; and with very trifling care this delicious fruit may be produced in great abundance for many successive years." "Garden and Forest," 1894, p. 467, says, "Some nine thousand acres of land in Western New York are devoted to the peach industry. . . . Professor Bailey thinks that the peach industry, more than any other pomological interest, suffers peculiarly from careless methods. The first error is lack of cultivation; the second, inattention to borers and yellows; the third is neglect to thin the fruit, and the fourth is carelessness in marketing." Then follow excellent suggestions on Locations and Soils, Cultivating and Fertilizing, and Pruning and Thinning Fruit. On this last point we copy the remarks, which are practical and very useful.—"No two peaches should be allowed to develop nearer than five inches apart. No work of the orchard pays better than thinning the fruit, either in the price which the remaining produce brings or in the energy which is saved to the tree. When regularly thinned the tree bears every year unless injured by frost. The fruit must be picked sooner or later, and the work is more easily done in June than in September, so that no labor is lost. The thinning should be delayed until the fruit is the size of the end of a man's thumb, and by this time the 'June drop' has occurred, and the fruit can readily be seen." The points suggested in regard to marketing are so well known to all cultivators that it is unnecessary to reproduce them; suffice it to say that too much care cannot be exercised in handling and properly packing; crushed and bruised fruit is not attractive to the purchaser.

Now as to the Crosby Peach, that most conservative and careful of all careful periodicals, which is always slow in indorsing a new thing, "Meehan's Monthly" for 1894, p. 77, says, "The Crosby Peach seems to be a kind that has come to stay awhile and is well suited to New England gardens. It originated near Lowell, Mass., in 1875. It is one of the sweetest of the yellow Crawford class, and a particularly abundant and regular bearer."

We give the following statements by Mr. W. D. Hinds and Mr. A. J. Hinds in the belief that they will be found of much interest.

STATEMENT OF MR. W. D. HINDS.

TOWNSEND, Mass., Nov. 9, 1895.

MR. JOHN G. BARKER:

Dear Sir:—In reply to yours of the 5th instant I will say that after seeing the Crosby Peach fruit four years in succession previous to 1888, and two years when we had no peaches of any other variety, I decided to set out an orchard as soon as I could get the trees. As the originator had died and no one else was propagating this variety I set two hundred Fox Seedling trees in the spring of 1888 and rebudded them in August with the Crosby. This being my first attempt at budding I only got about a hundred of them to grow. In the fall of 1888 I sent some buds to Hale Brothers to bud some trees for me. From these I got one hundred and fifty trees, which I set in the spring of 1890. I had also grown from three hundred to four hundred trees, which I budded myself; some of them I set out and some of them I sold. In the spring of 1891, I received about two thousand trees from Hale Brothers, selling eight hundred of this lot to my brother and some to my father and setting some of the small ones myself. I have set two or three hundred every spring since, so that I have now about two thousand trees in my orchard. About six hundred trees were in bearing this season, from which I sold over twelve hundred baskets of very fine fruit, for from one dollar to two dollars per basket.

Had it not been for the severe frosts in May, while the trees were in blossom, I should have had at least five hundred baskets more, as I had over six hundred three year old trees on which the frosts killed all the blossoms; they were as full as possible up to

that time. My orchards have been fertilized with bone tankage and muriate of potash, using the tankage in the fall and the potash in the spring. Last spring I used about eight hundred pounds of sulphate of potash per acre. Of tankage I used from one to two tons per acre according to the age of the trees.

The trees have all made a satisfactory growth and bid fair now to give us more fruit next year.

We are just spreading on the tankage again, my brother and I using nearly thirty tons this fall. We intend to do our part to the best of our knowledge and if the chief of the weather bureau prescribes the right kind of a winter we hope to be able to invite the Committee again to see some more Peaches.

Very truly yours,

W. D. Hinds,

Excelsior Fruit Farm, Townsend, Mass.

Statement of Mr. A. J. Hinds.

John G. Barker, Esq.:

Dear Sir:— In compliance with your request I herewith give a brief synopsis of my experience in the Peach industry in Townsend, Mass.

I set my first two hundred and fifty trees in the spring of 1888, eight hundred in the spring of 1891, and a few each spring since, having now about two thousand two hundred trees. In 1893 I had from the first two hundred and fifty trees about two hundred and fifty baskets of fruit. I had about one thousand trees in bearing this year, from which I took two thousand five hundred baskets of fruit, and sold it at very fair prices.

From the start I have held to the clean culture method from early spring until about the 15th of August, and until the third year have usually sown winter rye at the last cultivation, ploughing it in in the spring. I have also used considerable quantities of meadow hay for mulching every season. For fertilizers I have used scrap and bone (tankage) and both muriate and sulphate of potash and wood ashes. I have used the above in varying quantities according to the present conditions of the trees and the previous condition of the land, but sufficient to produce a vigorous growth, necessitating thorough pruning twice each season to keep

the trees in shape. The growth and general appearance of the trees under the above treatment has been satisfactory.

Were I asked to name the *essentials* for the successful culture of Peaches I should say:

First. Proper selection of location and soil, which should be high and well drained.

Second. Proper setting out of the trees, which should not be too deep in the ground. Many trees make a bad start and are apt to have the yellows because set too deep.

Third. Constant and thorough cultivation throughout the growing season and watchfulness for borers and other insects.

Fourth. Close and energetic attention to pruning and thinning of the fruit. One-half of the crop should be picked by the time it gets the size of marbles.

And lastly as in most other lines of business, personal supervision and attention to details, which if I were to enumerate would make the reader tired, as well as the man whose lot it is to attend to those things closely enough to win success in the cultivation of peaches.

A. J. Hinds.

Townsend, Nov. 15, 1895.

Forest Hills Cemetery, Jamaica Plain.

Before calling your attention to the visit at this place, it may be well to remind you that in previous years, visits to cemeteries formed no small part of the duties of the Garden Committee. As early as 1857, 1858, 1859, and 1860, the Transactions record visits at Woodlawn Cemetery, Chelsea, and in 1858 and 1860 to Mount Auburn, Cambridge. I cannot find that any other visit was made there. In 1866 Mount Hope, West Roxbury, was visited; it was then under the charge of the late C. M. Atkinson, who was awarded a gratuity for skill and care in its management. In 1867, Oak Hill Cemetery, Newburyport, was visited. In 1868, Mount Hope was again visited, and a gratuity was awarded for successful efforts in improving the cemetery. In 1872, Newton Cemetery was visited, and a gratuity was awarded to the Superintendent, Henry Ross, who had done much to be commended in the work of Landscape Gardening. In 1875, Woodlawn was again visited and also Newton Cemetery. In 1877, Newton Cemetery was again visited, and a gratuity was awarded for correct taste displayed

in planting flower beds, and beautifying the grounds. In 1879 a visit was made to Pine Grove, Lynn; in 1884 again to Newton and Pine Grove, and in 1889 again to Newton, when an award was made for well kept grounds, and artistic laying out and improvement of the same. The next visit was to Forest Hills, in Roxbury, 1895. Since the Horticultural Society was the promoter of Mount Auburn Cemetery, which is known all over this continent and in foreign lands, and whose influence has done so much to improve our Rural Cemeteries, it seems eminently fitting that the connection between the Society and the cemeteries should be maintained.

The Garden Committee having expressed a wish that they might have an opportunity to visit Forest Hills, your Chairman, being the Superintendent felt that it might look like sounding his own praises, and confessed to some diffidence in extending the invitation, but upon consultation with the President of the corporation, it was decided to invite the Committee with the Trustees and other friends. On the 26th of September the invitation was accepted, and while a goodly number were present we regret that all who were invited could not be with us. About two hours were spent in driving through the grounds giving a general idea of the place.

Forest Hills was consecrated June 28, 1848, and was controlled by the City of Roxbury until the year 1868, when Roxbury was annexed to Boston, and by a special act of the Legislature it was then conveyed to the lot holders and since that time has been under the control of a board of seven Trustees, one being elected each year at the annual meeting of the proprietors. This Board of Trustees has full control of the affairs and property of the corporation, and under them all subordinate officers serve. Two committees attend to the business of the corporation, a Finance Committee, and a Committee on Care of the Grounds. The area of the grounds is two hundred and four acres, finely diversified. The last purchase, of what was known as the Milton estate on the east of the main entrance at Morton St., and directly opposite Franklin Park, is a very valuable addition and being so near the entrance enables the Trustees to offer to their patrons better located lots than at any time since the establishment of the cemetery. The location is very commanding affording a fine view of Jamaica Plain, Brookline, and the surrounding country. The access to this new addition is by a rustic stone bridge of unusually fine proportions, and in most excellent taste, from designs by the well

known architect, W. G. Preston, of Boston. The material for the main part of the structure is the natural pudding stone quarried in the grounds; the cap stone and all the trimmings are of Medford granite. Several prominent citizens have already purchased lots on this new part of the grounds.

The diversity of the grounds and the natural features are of immense advantage in laying them out; nature has lavishly bestowed upon them many fine features, especially in large and conspicuous boulders and natural rock surfaces, all of which have been retained, adding very much to the general effect of the grounds. An interesting and attractive feature is the grotto, or rockery, as many call it, all the rocks, of which there is a great abundance, remaining in their natural positions. This place has been improved by winding paths to the summit, where a rustic summer house is located, affording a delightful resting place. On a projecting point a bridge and a lookout enables the visitor to obtain a fine view of Lake Hibiscus, and the surrounding portion of the grounds. The ornamentation is of hardy shrubs and choice hardy and native plants and ferns, additions to which are constantly being made as the plants are re-arranged and opportunity offers. The highest point at the head of the grotto is Mount Dearborn. On Sweet-Brier path, which forms a part of this elevation is the lot in which Gen. Dearborn is interred. On it is a handsome marble vase bearing the name, "H. A. S. Dearborn," and on the base which supports it is the inscription:

"Erected by the workmen of Forest Hills Cemetery
to commemorate his many virtues."

This inscription tells the story of the monument in a simple and appropriate manner, and the flowers with which the vase is supplied testify to the sincerity of the tribute.

On the summit of the hill, but a few steps from this lot, is the Dearborn monument erected by his friends and fellow citizens. It is an elegant Corinthian column, of white marble, on a base which extends by scrolls on each side to smaller pedestals bearing funeral urns; the shaft is decorated with convex flutings; the capital is elaborately wrought, and is surmounted by a funeral urn with flame. On the front of the base is a raised tablet inscribed as follows:

"H. A. S. Dearborn,
Obiit Julii 29, 1851,
Ætat. 69."

On the opposite side, in a panel, is the brief, but expressive Latin inscription,

"Ossa in terra
quam dilexit, coluit, ornavit,
cives et amici mœrentes
condimus."

The monument is appropriate to the character and tastes of him in whose honor it is erected. It is in a lovely spot, not only bearing his name, and near the burial place of his kindred, but one which was with him a place of frequent resort while he was spared to watch the progress of the Cemetery.

As the most distinguished person whose remains were originally interred at Forest Hills Cemetery, and as the designer of the cemetery, if not its originator; also as the first President of the Massachusetts Horticultural Society, it seems proper that more than a mere passing notice should be given of his eminent services, which we copy from the early history of the cemetery.

In what is known as the old grounds, the improvements have been quite marked the past few years; nearly all the iron fences have been removed, and many of the unsightly granite curbings, and as far as possible the abrupt terraces have been removed, and gentle slopes substituted; large and worthless trees, of which there were many, have been cut down, and replaced with smaller trees and shrubs. The grass has greatly improved where this work has been done. In many places grass walks have been substituted for gravel, for in summer time when people visit the grounds most frequently, grass is much pleasanter than gravel to walk upon, and a grass walk adds greatly to the appearance of the grounds, as compared with gravel. For several years no gravel walks have been made.

Forest Hills is by no means a Lawn Cemetery, as some of the more modern cemeteries are termed, but it is a Garden Cemetery. The early history of the place indicates that this was the intention of the projectors. From the only written history, we copy the following: "One of the attractive features at Forest Hills is the profusion of flowers which bloom in some parts of it, making it in truth a Garden Cemetery. In most of the borders attached to the lots there are flowers in more or less abundance, besides which there are numerous triangles formed by the intersection of avenue

or paths, and other spots not quite adapted to burial lots which are prepared as flower borders, or are planted with various flowering shrubs." By this it will be seen that flowers were to form a very prominent feature in the attractions at Forest Hills, and to this time it is the same and will continue so notwithstanding the fact that some think they are a thing of past generations, and should have but a small place, if any, in the modern cemetery. In the triangles no tender plants are used, and evergreens now form a very attractive and pleasing feature at these places. Shrubs, both evergreen and deciduous have been introduced wherever they could be judiciously used; hardy plants form no small part of the ornamentation of the grounds. Tender plants are used but little beyond the private lots; there are so large a proportion of the proprietors who require them, that we can well afford to substitute other styles of planting in the ornamental beds. Sub-tropical beds when properly arranged are very attractive, and have been used to good advantage. The new flowering Cannas are freely used, and since we have found that Crotons will do well as bedding plants, they have been substituted for Coleuses. As handsome foliage plants the Acalyphas have no equal, and are certainly, like the Crotons, far superior to half-faded and sickly looking Coleuses. Half-hardy plants are found of much value, as they can be taken out at least a month earlier than the bedding plants, and remain out a month later. For the accommodation of these plants, a pit has been built the past season 80×25 feet, and is already filled with a good collection of plants, among which are fine specimens of Hollies, Myrtles, Yews, Aucubas, Laurels, Laurustinuses and the tender Retinosporas, etc.

The first Greenhouse was built in 1860; in 1868 it was removed and enlarged; in 1873 a large conservatory was built, with ranges of smaller houses. These were all heavy wooden structures, which after twenty years of use were much decayed and not worth the large cost of repairing, so that in 1893 the entire range was rebuilt in the most approved style of construction by the Lord & Burnham Co., and has proved entirely satisfactory. The total number of houses is seven, with 4,480 feet of cold frames. Plants used for spring flowering are Pansies, Myosotis, Daisies, Silenes, etc., 15,000 in all; Geraniums, 40,000; French Cannas, 8,000; Begonias, 6,000; Salvias, 3,000; Echeverias, 2,000; Coleuses, 5,000; Achyranthes, 6,000; Golden Pilea, 2,000; Abutilons,

8,000; Grasses, 500; Peristrophe, 700; Ageratum, 2,000; Heliotrope, 3,000; Cupheas, 800; Alyssums, 1,500; *Celosia cristata*, 3,500; Torenias, 2,500; Nicotianas in variety, 700; Lantanas, 500; Lobelias, 200; Acalyphas, 2,000; Crotons, 2,000; a total number of 117,700.

A Receiving Tomb was built in 1871, and since that time has been greatly improved; a fine porch of elegant proportions adds greatly to the architectural appearance of the structure. In summer, large Palms are placed at the sides under each arch, giving a very pleasing effect, while on either side are arranged large beds of half-hardy plants. Opposite the tomb is a fountain, of elegant design, which was procured at the Centennial Exhibition in Philadelphia. Around this fountain special attention is given to ornamental bedding, this being an unusually appropriate place for such work. Around the natural rock at the base of the bell tower and observatory is a large border filled with a choice collection of hardy plants; this we consider a very interesting spot, for from early spring until late fall something is in flower.

It is not possible to enumerate the large collection of trees and shrubs in use: it would take up too much space, but all the choice flowering shrubs are used in large qualities.

The Observatory or Bell Tower is located on a prominent eminence opposite the main entrance. The lookout, which is reached by an easy flight of steps, affords a magnificent view of the surrounding country in all directions. The Chapel and Office were built in 1884, and form a very unique and convenient building. The Chapel is greatly admired, and is frequently used for funeral purposes; no description could do it justice, it must be seen to be appreciated. A system of water-pipes was introduced in 1891, throughout the grounds, satisfactory arrangements being made with the city for the supply of water.

The growing demands of the proprietors, with the constant increase of the unoccupied portions of the grounds, rendered a building necessary for their accommodation at the east entrance. This summer such a building was finished, and it is not only a great accommodation to the patrons of the place, but a unique and appropriate ornament to that part of the grounds.

For the care of the grounds when the sale of lots shall have ceased, provision is being made by setting aside a certain per cent from every sale now made. This is deposited in two funds, the

Perpetual Care and Permanent Funds; the first named for the care of the lots; the second for the buildings and avenues. These two funds have already attained a good sum, and will be ample in the future for the purposes for which they are intended. I have only given a very brief sketch of Forest Hills Cemetery, but certainly as much as the occasion calls for. Its fine location and attractive entrance, together with its immediate connection with Franklin Park, and the excellent drives from Boston insures for it a very promising future, and the citizens will find in the development of the grounds, that they can all be accommodated in their wishes, from those whose means are limited to others whom good fortune has blessed with a greater abundance.

Mrs. B. P. Cheney's Estate, South Natick.

The object of this visit, made on the 2d of November, was especially to see the Chrysanthemums, of which we found a good collection of well-grown plants. Mr. John Barr, gardener, informs us that he grew 700 to one stem and bloom, which were propagated in May and planted out in June. He grew them indoors all summer. There were over one hundred distinct named Japanese varieties and twenty Chinese in the collection. Mr. Barr considers that quite a number of the Japanese are not worth growing except as exhibition blooms; 500 were grown in boxes on account of the convenience of handling them, it being an easy and quick way of filling up the house, and as they are done flowering they can be cleaned out gradually and the space used for other purposes. The results of this mode of cultivation were quite as satisfactory as growing them on benches. For fertilizing, clay and sheep manure were used. Thirty plants, mostly Japanese varieties, were growing in twelve-inch pots. Those growing in boxes were particularly noticeable, and that mode of cultivation — new to at least a portion of your Committee — it seems to them might be adopted by many growers as an easy way of giving a place to this popular flower.

There are three greenhouses and two vineries, one of the greenhouses being used as a Rose house; another for growing Carnations, Cyclamens, Cinerarias, and other winter flowering plants; and the other for Palms and Foliage Plants for use in the summer season. The Palms and many other plants are placed in

the vineries, until the Chrysanthemums in boxes are removed. In spring all available space is filled up with bedding plants. We were glad to notice a fine lot of the lovely Adiantum Farleyense in a most luxuriant condition, the treatment being quite different from that usually bestowed upon this superb fern, which is generally consigned to the stove; in this case it was the opposite, being in a cool house with the ventilators raised on a chilly day, November 2.

The estate contains about two hundred acres, largely in woods and grass; twenty-five or thirty acres have been thoroughly trenched and laid down into a lawn. A feature of the place is the many beautiful views. We hope in our next report to give a description of this fine estate, the day of our visit being so very wet that we could get scarcely any idea of the extent or beauty of the grounds. We found Mr. Barr a progressive man and a good grower, and accord to Mrs. Cheney our most hearty thanks for this delightful and profitable visit.

William Nicholson's Chrysanthemum and Carnation Houses, Framingham.

The last visit of the Committee was on the 4th of November, to William Nicholson's Chrysanthemum and Carnation houses, in regard to which he has favored us with the following letter:

Framingham, Mass., November, 1895.

John G. Barker, Esq.:

Dear Sir:—In reply to your request for a few items in regard to the culture of Chrysanthemums and Carnations on my place, I will say that the cuttings for my Chrysanthemums were struck the last of May and the first two weeks in June; potted into two and a half-inch pots, and planted out on benches July 26, after my crop of Tomatoes was through. The compost was made early in the spring, of one load of good rotted horse manure to four loads of loam, with two bucketfuls of fine bone meal to every five loads of loam and manure. After they began to show buds we fed once a week with liquid bone manure; once or twice with hen manure, and top dressed once with sheep manure. We plant six by eight inches apart on benches. The varieties that I deem best for market, for which strength of stem is most considered, are:

Yellow.—Early; Yellow Queen and Gold Lode. Late; Major Bonnaffon, W. H. Lincoln, and H. Lippincott.

White.—M. Bergman, Ivory, Mrs. Jerome Jones, Niveus, Pelican, and Minnie Wanamaker.

Pink.—Mrs. S. T. Murdock, Helen Bloodgood, Ada Spaulding, Viviand Morel, and Lady Playfair.

Dark Red.— Mrs. John Shrimpton and Cullingfordii.

These I consider best for Boston market. I think that Ermenilda will be a good pink variety for this market when it becomes better known, but it should not be grown to single stems on late-struck cuttings.

In regard to Carnations I will give you my mode of cultivation. The cuttings are taken for general stock for winter forcing from February 14 to April 1; pricked out in flats, which I prefer to pots; placed in cold frames about April 20, and planted out in the field from May to June 10. I have had splendid plants for fall use struck in April and planted in the field June 10. I prepare my ground in the following manner:

It is ploughed in the fall, about the middle of November, and left in the rough till spring; then I put on about once in three or four years eight barrels of lime to the acre, in heaps of say half a bushel. As soon as it is all powder, which will be in about ten days, or earlier if it rains, I spread all over the ground thinly. I put on about one ton of wood ashes to the acre and about five cords of manure, and plow it in about seven inches just before I plant out. I harrow it smoothly and plant the Carnations in beds, eighteen inches between the rows and fifteen inches between each plant in the row. Every fourth row I leave two feet, which makes it very handy to take out the weeds in summer. I think that it is owing to the lime and wood ashes that I am so free from all kinds of diseases, and that they present a glaucous appearance.

In regard to stopping, one must be governed by the kinds he grows and the time when he wants the flowers for market. Some kinds do not need stopping after July 25; others will need it until the last week in August.

The preparation of the loam for benches is as follows: plough up sod ground in the fall; get a car of good rotted horse manure from horses that are heavily grain fed; add one horse load of manure to four of loam, and two buckets of pure bone flour without acid; repeat that till your pile is large enough; turn two or three times and add two buckets of wood ashes to every five loads

(one horse loads). I always have my benches well washed with water and then give them a heavy coat of hot whitewash from fresh lime.

I begin to take in my plants September 1, and plant in the house about ten by twelve inches apart — a little more or less, according to the size of the plants, and after they are planted in the house syringe once in two weeks with four ounces of salt to three gallons of water, and the alternate week with the following formula: one pound of sulphate of copper in powder, and one quart of concentrated ammonia dissolved together in an earthern jar with water enough added to make three gallons. Keep it all perfectly air tight. Take a two-inch potful of this mixture and at the same time half a two-inch potful of clear ammonia and syringe alternate weeks with the salt mixture.

I also mulch my carnations about twice in the season with a light dressing of sheep manure.

As Mr. Nicholson has entered his Carnation house for the prize offered by the Garden Committee for 1896, we will not make any comments on the very excellent house which we saw when there on the 4th of November, except to say that it was a model of neatness and gave every evidence of thorough practical cultivation.

The Committee have made the following awards:

Society's Prizes.

For the best Vegetable Garden, to Nathaniel T. Kidder, Milton	$50 00
For best Fruit Garden, to W. D. Hinds, Townsend, for a superior Peach Orchard	50 00
For the second best to C. S. Pratt, Reading, for a Market Strawberry Garden	30 00
For the best house of Chrysanthemums arranged for effect with other plants, to Nathaniel T. Kidder, Milton	50 00
For the second best to Mrs. B. P. Cheney, South Natick	30 00
For the best house or houses of Chrysanthemums grown on benches, to William Nicholson, Framingham	50 00

Gratuities.

To J. W. Manning, Reading, for a superior collection of named Herbaceous Plants	35 00
To Mrs. J. W. Clark, Pomfret, Ct., for successful cultivation of Exotic Grapes	35 00
To Mrs. B. P. Cheney, for a house of Chrysanthemums grown in boxes	35 00
To William Nicholson, Framingham, for superior cultivation of Carnations	35 00
To A. J. Hinds, Townsend, for a well-cultivated and promising young Peach Orchard	35 00
To John G. Barker, Superintendent of Forest Hills Cemetery, for a well-kept and best-arranged Rural Cemetery, with choice Evergreens and Hardy and Tender Plants	50 00
Amount appropriated	$500 00
Amount awarded	485 00
Balance unexpended	15 00

For the Committee on Gardens,

John G. Barker, *Chairman.*

REPORT

OF THE

COMMITTEE OF ARRANGEMENTS,

FOR THE YEAR 1895.

By J. H. WOODFORD, Chairman.

We are glad to be able to report a prosperous year for the exhibitions of the Society just closed. The various and numerous shows during the year have at times taxed the ingenuity of your Committee to find space in the halls for the proper display of the various classes offered by the exhibitors, and then have space enough left for the comfort of visitors.

This state of things does not reflect any credit on the foresight of the Committee having our property in charge, for when we take into consideration the poor accommodations at our disposal and the very meagre net income that we receive from an investment of half a million of dollars, it seems to us that we ought to have very much better accommodations and vastly superior facilities for our shows out of an investment of half the money. This same inadequacy of accommodation has been repeatedly referred to by the presidents of our Society, and by several chairmen of committees in their annual addresses and reports, and still, as far as our Society knows, no notice has been taken of their statements. We would suggest that the Committee having the building in charge

be called to account and their action or inaction be laid before the Society for its consideration.

The halls are not commodious enough for our great shows, and are also very difficult of access, particularly for aged persons, and there is no place for rest after anyone gets into them, except by climbing a third flight of stairs to the gallery.

We would recommend action in the immediate future with a view to acquiring a property of half the value of the present holding, and having a hall of easy access and of sufficient capacity to accommodate any and all of our exhibitions, and at the same time capacious enough to contain a large audience comfortably.

We have much pleasure in referring to the numerous commendations of exhibitors of Roses that we have received since we changed from the cumbersome, dirty boxes heretofore used in their display, to the clean bright glass vases owned by the Society. The change is decidedly to the advantage of this noble class of flowers.

We are also pleased to record the forming of an auxiliary society to ours called the Boston Mycological Club. This will be of immense advantage and value to all lovers of Mushrooms, as it will educate people to distinguish the Edible Fungi from the Poisonous.

There are at present great quantities of the edible kinds left untasted for fear that if eaten they might kill, but when the community is taught by object lessons to distinguish the good kinds from the bad, tons of this esculent vegetable will be consumed for food which now "goes to waste its sweetness on the desert air." We consider this as some progress in the right direction which we are making in the noble art of Horticulture.

The receipts for admission to the two exhibitions at which fees were exacted were larger than last year, but not nearly as large as they ought to be with proper facilities to make our shows attractive to the public.

The amount of money placed at the disposal of this Committee for extraordinary expenses has been judiciously expended and for the furtherance of the best interests of the Society. The halls have been well arranged during the season and in so judicious a manner as to produce but little friction among the numerous exhibitors.

The Treasurer shows by his books receipts		
for the Spring Exhibition . . .	$409 00	
Chrysanthemum " . . .	1.016 50	
		$1,425 50
Expenses:		
Spring Exhibition	$268 72	
Chrysanthemum Exhibition . . .	400 85	
		669 57
Leaving a balance in the treasury of the Society of		$755 93

All of which is most respectfully submitted.

For the Committee,

JOSEPH H. WOODFORD,

Chairman.

REPORT

OF THE

Committee on School Gardens and Children's Herbariums,

FOR THE YEAR 1895.

SWAN SCHOOL GARDEN, MEDFORD.

The first systematic attempt to introduce school garden work into the schools of Medford was made at the Swan School, on the corner of Park and Washington streets, early in the season of 1895. The teachers and pupils entered into the spirit of the work with the utmost enthusiasm, and its success has inspired other schools in Medford with a desire for garden work, which it is hoped the School Committee will be able to gratify another season with means furnished by the city.

The special aim of our School Garden and Herbarium Committee being to arouse and foster an interest in, and love for native plants, particular pains were taken to aid the teachers and children of the Swan School in establishing a garden of wild plants; and the appended list shows how many of the choicer and rarer of our native shrubs, flowers, and ferns have been introduced during the first year, and indicates what the policy should be for future seasons.

The frequent visits of both teachers and children to the woods for the purpose of obtaining plants for the garden showed their interest in the work. But the large amount of land surrounding the schoolhouse, and the broad plan on which the garden was laid out, rendered it difficult to make the garden attractive, as a whole, in one season by the use of wild plants alone; therefore the use of cultivated plants was allowed, not only to ornament the grounds, but to add interest and furnish ready working material.

Swan School Gardeners, Medford.

Swan School Garden, Medford.

The result has been more than gratifying, and while the native plants have not been neglected, as will be seen from the subjoined list, the cultivated flowers were the means of enabling some of the children during the summer vacation season to contribute something toward the pleasure of invalids in the hospitals by sending flowers from the Swan School garden to the Mission twice a week. Thus they not only received pleasure themselves and gave pleasure to others, but were unconsciously instructed in humane principles.

The portion of the school grounds set apart for the garden work comprises approximately between 2,500 and 3,000 square feet, and the different beds laid out were treated differently, according to the character of the plants they were to receive.

The general treatment was as follows :— The soil was first well broken up and dug over to the depth of nearly two feet, and some twenty or more loads of rich loam and two good loads of old manure, rotted to pulverization, were mixed in thoroughly. The beds to be devoted to the ferns were not made so rich, because the intent was to imitate nature as far as possible.

Nearly all the planting except that of the trees was done by the children under the guidance of their teachers.

In addition to the native flowering plants 150 Gladiolus bulbs, 100 Tuberose bulbs, 125 Pansy plants, 25 Cannas, and 50 plants each of Sweet Williams, hardy Carnations, Verbenas, and Daisies were planted. Cryptogamous plants were represented by 28 species of hardy native ferns.

100 feet of garden hose with a reel, 6 watering pots, 3 sets of garden tools, including a spade, and 2 extra large tubs for water-plants, were furnished, all of which will come into use next season.

Since November 1, there have been planted for spring blooming over 200 bulbs including hyacinths, narcissi, and tulips in variety, a good part of them having been furnished by the Garden Committee, a large number of scilla bulbs, several fresh crowns of the ostrich fern, mossy clumps of Polypodium vulgare, Woodsia Ilvensis, Phegopteris hexagonoptera, and Iris Kaempferi.

The garden has also been put in order for the winter by having the shrubby plants staked and the various beds raked over and covered for protection.

The expenses of the garden have been met from appropriations by the School Garden Committee, and generous contributions from Gen. Samuel C. Lawrence, Mayor Baxter E. Perry, J. Henry

Norcross, M. J. Dwyer, and others interested in seeing the experiment of school garden work tried in Medford.

The educational value of such work is beyond question, and in some European countries is considered of sufficient importance to justify legal enactments establishing and providing for it as a necessary part of a school's equipment.

Not only do these gardens beautify school grounds and make the schools more attractive to the children, but they serve the purpose of supplying, close at hand, material for nature study of a diversified character. The plants and flowers attract a variety of birds and insects, so that the children, under the guidance of an intelligent teacher, may receive object lessons in natural history that they can get in no other way without great difficulty.

The success which has attended the George Putnam and Robert G. Shaw school gardens in Boston and this new garden in Medford should be an incentive for other schools to emulate the example thus set before them, and it is to be hoped that school committees will encourage their development and support wherever possible.

I resigned from the Medford School Committee last September, but I am not without hopes that the Committee will be able another year to continue the work so successfully begun.

The following list of the native plants set out is appended for future reference and comparison:

Catalpa speciosa.
Cladrastis tinctoria.
Liriodendron tulipifera.
Magnolia glauca.
Kalmia latifolia.
Calluna vulgaris.
Asclepias tuberosa.
Aster Novæ-Angliæ.
" " var. *roseus.*
Geranium Robertianum.
" *maculatum.*
Trillium grandiflorum.
" *erectum.*
Tiarella cordifolia.
Opuntia vulgaris.
Azalea nudiflora.
Azalea viscosa.
Viburnum lantanoides.
Rhododendron maximum.
Cornus Florida var. *rubra.*
Aquilegia Canadensis.
" *chrysantha.*
" *cærulea.*
Arisæma triphyllum.
Claytonia Virginica.
Hepatica triloba.
Sanguinaria Canadensis.
Cypripedium pubescens.
" *parviflorum.*
" *spectabile.*
Viola Canadensis.
" *pedata.*
" *blanda.*

31 species and 2 varieties recorded.

Anemone nemorosa and some others brought by the children are not recorded.

FERNS.

Osmunda regalis.
" *cinnamomea.*
" *Claytoniana.*
Onoclea sensibilis.
" *Struthiopteris.*
Dicksonia pilosiuscula.
Phegopteris hexagonoptera.
" *polypodioides.*
Asplenium Filix-fœmina.
" *thelypteroides.*
" *angustifolium.*
" *Trichomanes.*
Woodsia Ilvensis.
Woodwardia Virginica.
" *angustifolia.*
Camptosorus rhizophyllus.
Pteris aquilina.
Polypodium vulgare.
Aspidium cristatum and var. *Clintonianum.*
" *Boottii.*
" *aculeatum* var. *Braunii.*
" *marginale.*
" *acrostichoides.*
" *Goldieanum.*
" *spinulosum* and var. *intermedium.*
" *Thelypteris.*
" *simulatum.*
" *Noveboracense.*

27 species, 3 varieties.

GEORGE E. DAVENPORT,

Sub-Committee, Swan School, 1895, to September

GEORGE PUTNAM SCHOOL GARDEN, ROXBURY.

The plants named below, numbering thirty species, were for the most part put into the garden during the warm season of 1895:

Spiranthes cernua.
Goodyera pubescens.
Clintonia borealis.
Cypripedium acaule.
Iris versicolor.
" *Pseudacorus.*
Maianthemum Canadense.
Moneses grandiflora.
Pyrola elliptica.
" *secunda.*
Chiogenes serpyllifolia.
Solidago arguta.
Aster paniculatus.
Anaphalis margaritacea.
Gnaphalium polycephalum.
Achillea millefolium var. *roseus.*
Potentilla Norvegica.
" sp.
Cornus Canadensis.
Medeola Virginiana.
Oxalis Acetosella.
Viola rotundifolia.
Linnæa borealis.
Aralia trifolia.
Asarum Canadense.
Thalictrum purpurascens.
Hedeoma pulegioides.
Parnassia Caroliniana.
Woodwardia Virginica.
" *angustifolia.*

Some cultivated plants have been added, and half a gross of hyacinth and tulip bulbs were planted in October; but the stress of the work done has been in furnishing ample means for studying wild plants as they grow.

The pupils of the first class have studied fifteen species of ferns by means of pressed specimens, specimens brought in for the lesson, lantern slides of three kinds,—first of the reproductive organs, second, of pressed specimens, third, of growing clumps in their native habitats, — and lastly by observing all the species growing in the school garden. They have studied them about six weeks, have drawn and studied all the minute parts, spores, sporangia, indusia, sori, pinnules, pinnæ, rachis, stipe, general shapes, textures, and relative positions of parts. Most of the drawing has been done on the board off-hand on call. Every pupil made a sheet of drawings of such characteristic parts as he chose; some of the drawings were colored, and the best were put

Children Observing in George Putnam School Garden.

Children Observing in George Putnam School Garden.

on exhibition at the Mechanics' Fair. Every pupil at the end of his study wrote a composition on ferns, and it remained an uncorrected first draft.

Various classes in the school during the autumn studied composite flowers and the distribution of seeds, by means of the material obtained in the school garden and by visiting it. The dahlia tubers and gladiolus corms have aided two classes in the fall study of roots.

The garden has been established five years, and the size, beauty, and vigor of the plants must be ascribed no less to proper time in which plants can grow than to good care and changing them to suitable conditions. During these five years an attempt has been made to carry out the instructions of the Committee, namely, to stock the garden with wild native plants and economic plants, to illustrate the actual use made of the garden by means of children's graphic work, and to present photographs of such plants as would give the Committee a somewhat adequate idea of the contents and condition of the garden.

Some cultivated plants, although not required, have been introduced to play a minor part, chiefly for the ornamentation of the grounds and the decoration of teachers' desks. The cultivated plants have not been named, but each native wild plant bears a copper-wired tree-tag on which its name is written.

No attempt has been made to arrange the wild native plants, such as asters, golden-rods, and ferns, in decorative or ornamental beds; first, for the reason that the Committee in their instructions have expressed their disapproval of mere ornamental beds; and, second, for the reason that beds of any considerable size have been found to be of little use for practical work. When fifty-six pupils at a time are to study growing plants the plants must be accessible, and therefore scattered as much as is consistent with other conditions, especially that of caring for the plants and mowing the grass about them. Three or four times as many children can examine twenty plants set in rows as can examine them arranged in a bed; and the work of weeding the plants and cutting the grass in the former arrangement is not half as much as in the latter.

During the long summer vacation the janitor of the school building weeds and waters the plants and cuts the grass periodically. In spring and autumn he wheels in and spreads fertilizing

material, prepares new beds or rows, and resets old ones. For this work he receives ten dollars every year. When a garden has been established five years and has received yearly many additional plants, the labor involved is considerable, and it should be kept at a minimum for the salvation of the garden.

From five to eight dollars' worth of fertilizer is put into the garden at a time; this year six dollars' worth. The first prize of fifteen dollars awarded to the garden has defrayed these expenses up to this time. By this it will be seen that the garden is put on an economical and useful basis in accordance with the practical experience that comes from adapting means to ends.

H. L. CLAPP, *Principal.*

CHILDREN'S HERBARIUMS.

The Exhibition of Children's Herbariums, November 29 and 30, 1895, was the most satisfactory exhibition of its kind that has been held in Horticultural Hall. The various packages of pressed plants were sent to the Committee very plainly and adequately labelled, so that the allotment of space necessary to keep each collection unbroken and the laying-out of the specimens were made comparatively easy. The somewhat explicit instructions in the circulars of the Committee were closely carried out.

The number of exhibitors, as well as the number of specimens, was smaller than in 1894, but the quality of their work was much superior. Some remarkable examples of pressing, mounting, and preserving the natural colors of flowering plants were exhibited, especially in Arthur E. French's collection of 125 specimens, which were selected from a collection numbering 200 specimens that were changed to fresh paper every day during the pressing process. The preservation of the colors of the flowers was probably due to that careful work. Master French took the first prize for twenty ferns at our Exhibition in 1894.

Arthur C. Faxon exhibited highest grade work in sedges, grasses, and leaf sprays of shrubs. His combination of scientific and artistic arrangements and naming were beyond criticism. It was his fourth exhibition of herbarium specimens.

Gordon Weinz, a little boy eight years old, took the second prize for fifty flowering plants. His interest in the other children's collections was pleasant to see.

Phillips Barry contributed this year for the fourth time, and gave evidence of his earnestness, industry, and knowledge, in the form of one hundred flowering plants that he had not previously exhibited, among them being fourteen orchids, some of which are quite rare.

The fern collections, though not large, were of fine quality, and the labelling in vertical writing was the finest ever seen at our exhibition, especially that done by Theresa Cohn and Lulie D. Ellis. The ferns of the latter exhibitor were exceptionally fine.

From such work every observer and exhibitor may learn that care in every particular is necessary to insure a fine exhibit.

The labelling was much more correct than in any previous year of our exhibition; but the Committee were unable to identify some rare specimens, owing to a lack of such herbarium specimens as it was suggested last year that this Society should have for permanent reference.

In 1894 twenty-eight children exhibited sheets of leaves, two on a sheet, to the number of eight hundred. The work bore evidence of haste and transitory interest, and the Committee concluded that it was not of sufficient educational value to be continued. They restricted the work on leaves to sprays mounted on regular botanical sheets, which are twice the size of the sheets used by the children for leaves last year; consequently, a large number of leaf contributors dropped out, there being but one contributor this year. Nevertheless, the quality of the whole exhibition has been obviously improved.

Sedges, grasses, and ferns, which require more careful study and are more difficult to name correctly than flowering plants, taken together were more numerous than last year. There was a gain in sedges and grasses and a loss in ferns. Sedges and leaf sprays of shrubs were displayed at our exhibition this year for the first time.

The service that some of these young botanists have rendered and are likely to render in botanical work may be indicated by mentioning some of the donations of herbarium specimens which they have already made. The following notice was taken from the "Jamaica Plain News:"

"Arthur C. Faxon of School street, has lately made and presented to the George Putnam school a most valuable collection, consisting of the pressed and mounted leaves of eighty-four native trees of Massachusetts. Many of the sheets contain the flower and fruit in addition to the leaves, and the specimens are so gracefully arranged as to testify to Master Faxon's artistic skill in grouping, while the careful mounting and labelling make the collection an instructive guide to a knowledge of our own trees. Such earnest and accurate work cannot fail to have a stimulating effect upon the many children whose privilege it will be to examine it, and the school is much indebted to Master Faxon for this important waymark in its study of nature."

Already the teachers of the school in their work with leaves have often had the privilege of examining the collection.

At the close of our last exhibition Phillips Barry presented to the George Putnam school eighty-seven exhibition specimens of flowering plants and ferns. These will form an important addition to the working material of the school.

Miss Ann E. Newell of South Boston, has presented to the same school some pressed specimens of rare ferns from the island of St. Helena. The gift was suggested by her seeing our exhibition.

Even in these young botanists we can discern the spirit of the scientist. No sooner does he learn the secrets of nature than he desires to share his knowledge with others. So he gives his time and material. Some of these young people may become eminent in the future, and we hope this Society may have occasion to refer with pride to the steady encouragement it gave them at the beginning of their botanical work.

The encouragement given to the exhibition in the form of appreciative and generous notices by the representatives of the daily newspapers is well worth mentioning. Undoubtedly the excellent attendance on the second day was largely owing to those notices.

This year premiums for school herbariums are offered. A few pupils in many schools will be able to contribute specimens for their own schools and the aggregate will be large. If an herbarium, with plants properly identified and labelled by the aid of our Committee, can be thus formed in each of many schools, teachers and pupils alike will be stimulated to carry out the work contemplated by the Committee, and at the same time have one of the most practicable means of continuing the work from year to year, although the teaching corps may change yearly. An attractive and permanent herbarium will be like a sheet anchor to hold the plant work to its true course.

PRIZES AND GRATUITIES AWARDED FOR SCHOOL GARDENS AND CHILDREN'S HERBARIUMS, 1895.

School Gardens.— George Putnam School, first . 'and Robinson's "Ferns in Their Homes and Ours," special prize for the best collection of growing ferns.	$15 00
Swan School, Medford, second . . . . . and " Ferns in Their Homes and Ours," special prize for the best collection of flowering plants.	12 00
Also special prize to Swan School for excellence of first year's work	5 00
Children's Herbariums. Flowers.— First prize for one hundred and twenty-five specimens, Arthur E. French	5 00
First prize for fifty specimens, Carrie P. Webber	2 00
Second prize for fifty specimens, Gordon Weinz	1 50
Gratuity for fifty specimens, Bertha Rowe . .	1 25
Gratuity for fifty specimens, Ethel M. Thomas .	1 00
Special prize for one hundred additions, Phillips Barry	4 00
Special prize for twenty-five additions, Willis H. Weinz	1 00
Grasses.— First prize for ten specimens, Phillips Barry	1 00
Second prize for ten specimens, Willis H. Weinz	50
Special prize for ten additions, Arthur C. Faxon	2 00
Sedges.— First prize for thirty specimens, Arthur C. Faxon	3 00
First prize for twenty specimens, Arthur E. French	2 00
Ferns.—First prize for fifteen specimens, Lulie D. Ellis	3 00
Second prize for fifteen specimens, Christine L. Lewis	2 00
First prize for ten specimens, Bernice L. Dole .	1 75
Second prize for ten specimens, Katherine Dewey	1 25
Gratuity for ten specimens, Mabel M. Wood .	1 00
Gratuity for ten specimens, Theresa Cohn . .	1 00

Gratuity for ten specimens, Genevieve Goudy	$1 00
Gratuity for ten specimens, Phillips Barry	1 00
Special prize for nine additions, Ethel M. Egan	2 25
Shrubs.—First prize for thirty specimens, Arthur C. Faxon	2 00
Extra Awards.— Arthur E. French for special excellence in pressing and mounting flowers	2 00
Arthur C. Faxon for special excellence in pressing and mounting leaves	1 00
Carrie P. Webber for excellence in pressing and mounting succulent plants	1 00
Miss Webber also placed on exhibition specimens of grasses and sedges, Gratuity	75

Amount of Premiums for School Gardens	$32 00
" " " " Herbariums	34 25
" " Gratuities for Herbariums and excellent work	11 00
Total awards,	$77 25

Other Expenditures.

Paper, printing, bulbs, expressage, exhibition expenses, garden appropriations, etc.	$73 36
Total.	$150 61
Balance of appropriation ($250) on hand,	$99 39

Henry L. Clapp, Roxbury,
Mrs. H. L. T. Wolcott, Dedham,
George E. Davenport, Medford,
Miss Katharine W. Huston, Roxbury,
Mrs. P. D. Richards, West Medford,
William P. Rich, Chelsea,
W. E. C. Rich, *Secretary*,
99 Moreland St., Roxbury, Mass.

Committee on School Gardens and Children's Herbariums.

REPORT OF THE DELEGATE

TO THE

Massachusetts State Board of Agriculture,

FOR THE YEAR 1895.

By E. W. WOOD, of West Newton, Delegate.

The Legislature of Massachusetts as early as 1819 took action for the aid and encouragement of Agricultural Societies by passing the following act:

An Act for the encouragement of Agriculture and Manufactures.

Sec. 1. Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, That every incorporated Agricultural Society within this Commonwealth which shall have raised by subscription of individuals, or which may hereafter raise by such subscription and put out to interest on public or private security the sum of one thousand dollars as a capital stock appropriated for the uses of said society, shall be entitled to receive in the month of October annually out of the treasury of this Commonwealth the sum of two hundred dollars; and also a proportionable sum annually for any greater sum which they should so subscribe and put out to interest as a capital: Provided, always that no agricultural society shall receive by virtue of this act within one year any greater sum than six hundred dollars.

Additional sections provide for the formation of new societies and the limitation of their boundaries; and also require all societies receiving the benefit of this act to file in the office of the Secretary of the Commonwealth annually, in the month of October, a certificate signed by the President and Treasurer of such society speci-

fying under oath the sum actually subscribed and put out to interest. Also to transmit to the Secretary's office in the month of January annually an official statement of their proceedings in relation to the expenditure of the money received from the State.

The above act with certain amendments required as the number of societies increased, and by the transfer of the work from the office of the Secretary of State to the office of the Secretary of the State Board of Agriculture, is substantially the law at the present time as it relates to the connection of the State with the Agricultural Societies.

On April 12, 1837, the Legislature passed the following Resolve:

Resolved, That His Excellency the Governor, by and with the advice of the Council is hereby authorized and requested to appoint some suitable and competent person whose duty it shall be under the direction of His Excellency the Governor, to make an Agricultural Survey of the Commonwealth, collect accurate information of the state and condition of its Agriculture and every subject connected with it, point out the means of improvement, and make a detailed report thereof with as much exactness as circumstances will admit.

Resolved, That a summary of such survey and examination shall be furnished to His Excellency the Governor every six months until the whole shall be completed; and at such other times, as shall be required, to be published in such way and manner as he with the advice of the Council shall deem to be expedient and useful; and he is authorized to draw his warrants from time to time, upon the treasury for such sums, as may be necessary to defray the expenses of said survey, and to enable the person, so appointed, to proceed in the execution of the duties, that shall be required of him; and to pay the same to him, not exceeding the sum of two thousand five hundred dollars per annum.

Rev. Henry Colman was appointed Commissioner on the 27th of the ensuing May. He published four reports, which were widely circulated in this country and attracted favorable attention abroad. The resolve was repealed and the office discontinued, by chapter 14 of the Resolves of 1841. In one of his reports Commissioner Colman made the first published suggestion of a State Board of Agriculture.

The commissioners to whom were referred the resolves of the Legislature of 1850, concerning the establishment of an agricultural school, etc , in their report in January, 1851, recommended the establishment of a State Department of Agriculture, which should sustain a similar relation to Agriculture and the schools connected with it, as the Board and Secretary of Education do to the primary schools.

In 1850, Hon. Amasa Walker, Secretary of the Commonwealth, wrote: "But something it is believed may be safely attempted, a beginning may be made, a Board of Agriculture may be established by the authority of the State; corresponding in its general features to the Board of Education. Such a board might at once be empowered to employ an able secretary whose whole time shall be devoted to the work of obtaining and diffusing information on the subject of agricultural education, and whatever else concerns the great farming interests of the Commonwealth."

The first meeting of the voluntary Massachusetts Board of Agriculture was held September 3, 1851, at the State House, Boston. The following list of officers for a permanent organization of the Board was reported and accepted: President, Marshall P. Wilder; Vice-Presidents, Henry W. Cushman, John W. Lincoln; Corresponding Secretary, Allen W. Dodge; Recording Secretary, Edgar K. Whitaker.

At the second meeting of the Board, January 14, 1852, it was

Resolved, That inasmuch as Agriculture is the chief occupation of her citizens, the Commonwealth, in the organization of its government, should be provided with a Department of Agriculture, with officers commensurate with the importance of the duties to be discharged, of the abilities to be required, and of the labors to be performed.

Through the earnest efforts of the Board and the active cöoperation of the agriculturists throughout the State, the Legislature of 1852, with great unanimity passed the following act.

Acts 1852, Chapter 142.

An Act to establish a State Board of Agriculture.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same as follows:

Sec. 1. A State Board of Agriculture is hereby established, to consist of His Excellency the Governor, His Honor the Lieutenant Governor, and the Secretary of State *ex officiis;* of one member from each of the Agricultural Societies in the Commonwealth that receives an annual bounty from the State, and of three members to be appointed by the Governor and Council. Said members shall hold their offices for three years, except as hereinafter provided; and the Governor and Council, and the Agricultural Societies as aforesaid, shall, within sixty days after the passage of this act, appoint said members; and afterward whenever vacancies shall occur.

Sec. 3. It shall be the duty of this Board to investigate all such subjects relating to improvement in Agriculture in this Commonwealth, as they may think proper; and they are hereby empowered to take, hold in trust, and exercise control over any donations or bequests that may be made to them for promoting agricultural education, or the general interests of husbandry.

All the societies receiving bounty from the State are required to award in premiums an amount at least equal to the amount received, and to hold every year three institutes, the Board furnishing one speaker to open the discussion.

Since 1863 the Board has held in December annual winter meetings continuing three days, in different parts of the State, when agricultural and horticultural subjects have been discussed; and an annual business meeting in February, when reports from the inspectors visiting the exhibitions of the societies are received, essays by members upon subjects selected at the previous meeting are read, and committees elected to perform the routine work of the year. The proceedings of these meetings are published in full, and fifteen thousand copies are distributed by the members of the Legislature, Agricultural and Horticultural Societies, Granges, and Farmer's Clubs throughout the State.

The work of the Board has been much increased within the past few years. In 1891 the Legislature passed an Act to provide for the Protection of Dairy Products, and to establish a State Dairy Bureau. The execution of the provisions of this Act was placed in the Board of Agriculture; also the duties required by an Act, passed in 1891, to authorize the State Board of Agriculture to collect and circulate information relating to Abandoned Farms;

also an act, passed in 1891, to provide against Depredations by the Insect known as the *Ocneria dispar* or Gypsy Moth. For carrying out the provisions of this act the State has already appropriated more than half a million dollars.

The officers of the Board are, a President, who is the Governor of the Commonwealth, two Vice Presidents, a Secretary, and eight Standing Committees; said committees to consist of five members each, except the Executive Committee, which consists of seven members being composed of the Chairmen of the seven other committees.

The eight Standing Committees are, an Executive Committee, a Committee on Agricultural Societies, a Committee on Domestic Animals and Sanitation, a Committee on the Gypsy Moth, Insects and Birds, a Committee on the Dairy Bureau and Agricultural Products, a Committee on the Agricultural College and Education, a Committee on Experiment and Station work, and a Committee on Forestry, Roads, and Roadside Improvements.

At the present time the number of members constituting the Board of Agriculture is forty-six.

E. W. WOOD,

Delegate from the Massachusetts Horticultural Society.

REPORT

TO THE

STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1895.

By GEORGE CRUICKSHANKS, of Fitchburg.

The exhibitions of the Massachusetts Horticultural Society for 1895 have closed. The year has been one of advance in everything pertaining to horticulture in fruit, flower, and vegetable. The lectures delivered before this Society, in one of its halls, were well attended. Those of this season's course were as follows:

January 12. Days with our Birds, by Mrs. Kate Tryon, Cambridge.

January 19. Flower Pots and their Manufacture, by A. H. Hews, North Cambridge.

January 26. Fungous Diseases of Ornamental Plants, by Professor Byron D. Halsted, New Brunswick, New Jersey.

February 2. Hardy Plants and Shrubs and their Arrangement, by J. Wilkinson Elliot, Pittsburg, Pa.

February 9. Glass Houses, their Construction and Heating, by Henry W. Gibbons, New York.

February 16. Economic Entomology in Relation to Trees, Shrubs, and Plants in Parks and Private Grounds, by E. B. Southwick, New York.

February 23. Experimental Evolution amongst Plants, by Professor L. H. Bailey, Ithaca, New York.

March 2. A Talk on Gardens, by David Hill Coolidge, Jr., Boston.

March 9. Budding and Grafting, by Jackson Dawson, Arnold Arboretum, Jamaica Plain.

March 16. Tomatoes, by Professor W. M. Munson, Orono, Me.

March 23. Edible Native Fungi, by Hon. John M. Kinney, Boston.

March 30. Commercial Fertilizers, as applied to Horticulture, by Professor W. H. Jordan, Orono, Me.

The amount appropriated to be awarded in Prizes and Gratuities during the year 1895, was $8,250.

The Spring Exhibition began March 26, and continued four days. The Upper Hall was devoted to a fine show of pot plants, comprizing the different classes of Spring Flowering Bulbs, such as Hyacinths, Tulips, Narcissuses, and Jonquils, and a fine display of Cinerarias, Cyclamens, Orchids, and Azaleas. The Lower Hall was devoted to an excellent show of cut flowers and early vegetables.

The Annual Exhibition of Fruits and Vegetables began October 2, continuing two days. The show of fruit has not been surpassed by this Society; many of the specimens were of extra size and of fine form and color. The vegetables were all of excellent quality. Very large exhibits of Tomatoes and Potatoes were made.

The crowning exhibition of the year, the Chrysanthemum show, which is looked forward to with great interest by all lovers of the beautiful in flowers, opened November 5, to hold four days.

The Upper Hall was devoted to the display of pot plants. The Committee of Arrangements are entitled to much credit for the plan of arranging the plants in groups so as to give the best effects. Each exhibition of a group of plants arranged for effect was limited to one hundred and fifty square feet, the very liberal premiums offered bringing out the best.

On entering the Lower Hall, which was devoted to the cut flowers, several tall vases filled with large flowers of all the different colors met the eye of the visitor. The cut flowers were all of fine quality; the row of vases in front of the platform has not been equalled. The number of exhibitors was larger than heretofore; besides the growers of Massachusetts, those of New Hampshire, Connecticut, New York, and New Jersey entered the race for the coveted prizes. The Chrysanthemum show of 1895 for large flowers, fine form, purity of color, and robust, healthy foliage has not been equalled.

George Cruickshanks,
Delegate.

REPORT

OF THE

COMMITTEE ON THE LIBRARY,

FOR THE YEAR 1895.

Nothing startling has occurred in the affairs of the library during the year. As in former years there has been no difficulty in spending all our available funds to good advantage, and, as usual, a full list of all purchases, as well as of books and pamphlets received as gifts, will be found in the TRANSACTIONS in due time. It is not necessary to name many of these acquisitions here, but the completion of the Hortus Kewensis is an event of such exceptional importance that it deserves especial mention. Probably no work we possess will be more useful than this, which does for species what Bentham and Hooker's great work does for the genera of plants.

Another work, our Catalogue of Plates, is, we believe, of equal importance within the limits of our own library, and even outside of this place and Society it has proved of value and will be more and more so as time goes on. We are of opinion that no money the Society has appropriated has been spent to better advantage, and we take pleasure in stating that the advance made in it this year has been no less than in former years.

This report would hardly be recognized as emanating from the Committee on the Library if no mention were made of the lack of room; and yet it seems hardly necessary to speak of it with such an object lesson continually before our eyes. Wherever we look

we see books in places where no books should be, — on the tables and on the floor, and hundreds of other books there are which ought to be in sight but which are packed away behind others, just as they were last year and the year before and the year before that. "These things ought not so to be."

For the Committee,

W. E. Endicott,

Chairman.

If the arrangement of the Transactions generally adopted were kept up, the List of Library Accessions would here follow the Report of the Committee on the Library, but so much time is unavoidably required to prepare this list that, in order not to delay the printing of the Transactions, the Committee on Publication have directed that the List of Library Accessions be published in a separate pamphlet as Part III of the Transactions for 1895.

REPORT

OF THE

SECRETARY AND LIBRARIAN,

FOR THE YEAR 1895.

The report of the work in these departments is, from the necessity of the case, in many respects very similar in one year to that of another. The records of the Society as well as those of three Committees have been faithfully and acceptably kept, as also copies of the records of Prizes and Gratuities awarded. The abstracts of the lectures delivered before the Society have, as after every Meeting for Discussion during the preceding twelve years, been placed on the table on the succeeding Saturday. The Schedule of Prizes for 1895 was, as it has been every year for many years, ready at the beginning of the year, and that for 1896 will form no exception to this rule. That the publication of the TRANSACTIONS has not been equally prompt is due partly to the increase in size, especially in the most difficult part, the List of Library Accessions, which more than doubled in length in the three years from 1891 to 1894. This has conspired with other circumstances beyond my control to cause delay which, however unavoidable, is much to be regretted. The revision of the Constitution and By-Laws, extending over much more time and going through more changes than usual, added much to the work in the Secretary's department.

I have spoken of the great increase in the accessions to the Library, but this means not only more work in preparing the printed list, which may be considered as an annual supplement to the Catalogue published many years ago, but means more than

double the labor in collating the books, in looking out for the completion of series, in recording, in cataloguing, and in all that is required before they can be placed on the shelves ready for use by the members of the Society here and in their homes. Under the ideal administration this should be done as speedily as possible. It would seem that with proper facilities it should be effected, on the average, in a week after the books are received, but this has been found impossible, for two reasons, — first, the force employed is entirely insufficient, being no greater than before the extraordinary increase in rapidity of growth of the Library; and, second, the shelves are entirely inadequate to contain the books. From these two causes the work on the Library is continually hampered and embarrassed. We need not be surprised at the rapid increase of horticultural literature, for while research and publication in every other department of science and knowledge is more active than ever before, it would be strange if botany and horticulture should form an exception to this activity. It is not intended to question the statement of the Committee having in charge the provision of better accommodations for the Society that every effort within reason has been made, but on the contrary the difficulties in the way when this report was made, as well as those which have occurred since, are fully recognized. But it is submitted, with entire confidence, that until that time in the indefinite future, when adequate provision for all our needs shall have been made, it is absolutely necessary that some temporary provision be made for the bestowal of our books. If any proof of this statement is desired a glance around this room will supply it.

In this connection I wish to say that I have heard with much regret that members of the Society have been deterred by the crowded state of the Library Room from attempting to use the books when they desired. I hope that no one will be deterred by this or any other cause from asking for any book that he wishes to read or consult, in the assurance that if we cannot do for him all that he could wish, all those employed in the room will do everything in their power to facilitate his researches.

In former years, when both halls have been leased, this room has been the only resource in case of a Saturday exhibition of horticultural products. This contingency has not occurred for some time, but it is liable to occur again, and it is desirable to be

prepared for it, and not to be obliged to remove valuable books at a moment's notice, to the great danger of their injury. Moreover the question to what place they shall be removed, even for a few hours, is one not easily answered.

Among the more important additions to the Library during the year I would mention first, a set of Nature, in forty-seven volumes, the gift of Waldo O. Ross, a former Chairman of the Library Committee, whose zeal for the improvement of the Library has suffered no diminution in the seventeen years since his retirement, but there is no room in our bookcases for his valuable donation. Of those monumental works, the Index Kewensis and the Silva of North America, the former has been completed, and the latter has made good progress, volumes seven and eight having been placed on the shelves this year. Kniphof's Botanica in Originali, in four folio volumes, is interesting as being one of the first, if not actually the first, work of considerable extent in which the process of nature-printing was employed to illustrate plants. It was supposed that a copy in the library at Kew Gardens was unique in being colored, but the twelve hundred plates in ours are all colored, and it seems to be in every way as good a copy as that at Kew. That admirable work, Kerner and Oliver's Natural History of Plants has been completed. A set of the London Journal of Botany, which has long been a desideratum, as one member of a series forming substantially one work, all the others of which we have long possessed, has at last been secured, and a set, as far as published, of the later Annals of Botany has been purchased. A set of Ledebour's Flora Rossica, in five folio volumes, with five hundred colored plates, remarkable for the minuteness of the engraving, is among our most important acquisition in its line, and a set, in six octavo volumes, of William Gilpin's works on Landscape Gardening and Forest Scenery is a valuable addition to our collection of books on that subject. A set in sixteen volumes of The Gardener, a periodical edited by William and David Thomson, from 1867 to 1882, though less costly than the books above mentioned, finds an appropriate place in our library. Les Orchidées Exotiques et leur Culture en Europe, by Lucien Linden, and Le Livre des Orchidées, by the Comte de Kerchove de Denterghem, are two solid and valuable works on that family of plants. The great interest which has been awakened during the past year in Edible and Poisonous Fungi has led to the purchase of such works on that subject as

seemed most desirable. The number of Nursery and Seed Catalogues arranged during the year is probably greater than in any other year since we began to collect them. The whole collection has, during the year been alphabetically arranged and counted, and found to number over seven thousand.

The work of arranging and binding such books as were most in need has been steadily pursued. The periodicals annually bound form no small addition to our Library, and besides those a large proportion of the books bought are received in parts which require to be bound as soon as completed. The work of binding the agricultural newspapers, which for the last five years have been preserved as permanent additions to the Library, has not yet been begun, but it should not be much longer delayed.

Robert Manning,
Secretary and Librarian.

TREASURER'S REPORT

FOR THE YEAR 1895.

MASSACHUSETTS HORTICULTURAL SOCIETY *in account current to December 31, 1895, with* CHARLES E. RICHARDSON, *Treasurer.*

1895.	DR.		
Dec. 31.	To amount paid on account of the Library, in 1895, viz.:		
	For books, periodicals, and binding .	$403 00	
	From income of Stickney Fund, expended for books	771 90	
			$1,174 90
	To amount paid Interest on Funds for Prizes, credited below	$1,892 72	
	To amount paid Interest accrued on $5,000 Bonds for Sinking Fund . . .	101 88	
			1,994 60
	To amount of Prizes awarded in 1894, paid in 1895, as follows:		
	For Plants, ...	$1,887 90	
	" Flowers, ...	2,301 70	
	" Fruits, ...	1,716 00	
	" Vegetables, ...	1,089 00	
	" Gardens and Greenhouses . .	385 00	
	" H. H. Hunnewell Prizes for Rhododendrons, ...	105 00	
	" H. H. Hunnewell Triennial Prize .	160 00	
			7,644 60
	To amount paid on account of Committee on School Gardens and Children's Herbariums		150 61
	Amount carried over, ...		$10,964 71

Amount brought over, ...		$10,964 71
To amount paid Salaries of Secretary and Assistant, and Treasurer .	$3,600 00	
" " Salaries of members of Committees	1,010 00	
" " for extra services in Library and on Transactions . .	821 05	
" " on account of Committee of Arrangements . . .	400 00	
" " on account of Committee on Publication and Discussion	265 00	
" " on account of Committee on Large, Old, and Interesting Trees	50 00	
" " for Labor, including Janitor and Fireman . . .	2,755 15	
" " $5,000 in Bonds of West End Street R. R. Co. . .	5,162 50	
" paid for Heating	572 08	
" " Taxes for 1895 . .	2,560 00	
" " Insurance . . .	68 56	
" " City Water Rates . .	117 40	
" " Card Catalogue of Plates .	100 00	
" " Repairs	662 06	
" " Lighting	953 31	
" " Incidentals . . .	695 15	
" " Stationery, Printing, and Postage . . .	1,321 22	
" " Commission . . .	6 25	
" " Furniture and Exhibition Ware	320 15	
" " Legal Services . . .	500 00	
" advanced to A. P. Loring . .	5,000 00	
" paid William Caselden . .	50 00	
		$26,989 88
Total payments in 1895		$37,954 59
Balance of Cash on hand, December 31, 1895 . . .		7,495 35
		$45,449 94

1895.	Cr.			
Jan. 1.	By Balance of account rendered December 31, 1894			$13,541 89
	By Receipts from Building in 1895, viz.:			
	Rent of Stores . .	$17,450 00		
	" Halls . .	5,752 68		
			$23,202 68	
	By Income from Mount Auburn Cemetery .		2,308 03	
	" Received Massachusetts State Bounty .		600 00	
	" " from Annual Exhibitions, gross amount .	$1,425 50		
	Less expenses .	669 57		
			755 93	
	" " from Admissions and Assessments		1,348 00	
	" Interest received on Bonds	$1,237 50		
	" " " on Deposits in Bank	74 69		
	" " " from all other sources	60 00		
			1,372 19	
	" amount received from sale of Transactions		3 00	
	" " " " sale of one copy of History		2 50	
	" " " " H. H. Hunnewell, 1894 prize money		20 00	
	" " " " sale of duplicate book		3 00	
	" Insurance		400 00	
	" Interest credited to the following Funds against charges above:			
	Samuel Appleton Fund, $1,000, at 5%	$50 00		
	John A. Lowell Fund, $1,000, at 5%	50 00		
	Theodore Lyman Fund, $11,000, at 5%, ...	550 00		
	Josiah Bradlee Fund, $1,000, at 5%	50 00		
	Benjamin V. French Fund, $500, at 5%	25 00		
	H. H. Hunnewell Fund, $4,000, at 5%	200 00		
	William J. Walker Fund, $2,354.43, at 5%	117 72		
	Amounts carried over. . . .	$1,042 72	$30,015 33	$13,541 89

Amounts brought over, . . .	$1,042 72	$30,015 33	$13,541 89
Levi Whitcomb Fund, $500, at 5%	25 00		
Benjamin B. Davis Fund, $500, at 5%	25 00		
Marshall P. Wilder Fund, $1,000, at 5%	50 00		
John Lewis Russell Fund, $1,000, at 5%	50 00		
Josiah Stickney Fund, as per indenture	700 00		
	1,892 72		
			31,908 05
			$45,449 94

E. & O. E.

CHARLES E. RICHARDSON, *Treasurer.*

Boston, December 31, 1895.

Approved:

H. H. Hunnewell,
A. Hemenway,
Francis H. Appleton,
} *Finance Committee.*

ASSETS AND LIABILITIES OF THE MASSACHUSETTS HORTICULTURAL SOCIETY,

DECEMBER 31, 1895

ASSETS.

Real Estate,		$250,000 00	
Stereotype Plates and copies of History		257 00	
Chicago, Burlington & Quincy R. R. Bonds		1,500 00	
Sinking Fund		23,872 50	
Kansas City, Clinton & Springfield R. R. Bonds		1,980 00	
Notes Receivable		304 85	
Library		34,812 62	
Furniture and Exhibition Ware		6,988 91	
A. P. Loring		5,000 00	
Due from tenants, December 31, 1895		1,687 74	
Cash		7,495 35	
			$333,898 97

LIABILITIES.

Mortgage		$1,000 00	
Josiah Stickney Fund, payable to Harvard College, 1899		12,000 00	
Prize Funds invested in the Building, viz.:			
Samuel Appleton Fund	$1,000 00		
John A. Lowell "	1,000 00		
Theodore Lyman "	11,000 00		
Josiah Bradlee "	1,000 00		
Benjamin V. French "	500 00		
H. H. Hunnewell "	2,500 00		
William J. Walker "	2,354 43		
Levi Whitcomb "	500 00		
Benjamin B. Davis "	500 00		
	$20,354 43		
Prize Funds invested in Bonds:			
H. H. Hunnewell Fund	$1,500 00		
Marshall P. Wilder "	1,000 00		
John Lewis Russell "	1,000 00		
	3,500 00		
		$23,854 43	
Prizes for 1895, payable in 1896		8,250 00	
			45,104 43
Surplus			$288,794 54

CHARLES A. RICHARDSON,
Treasurer.

Membership Account of the Massachusetts Horticultural Society, December 31, 1895.

Life Membership per last report	556		
Added during 1895	23		
Commuted from Annual	8		
		587	
Deceased		24	
			563
Annual Members per last report	237		
Added during 1895	8		
		245	
Commuted to Life Membership	8		
Deceased	6		
Dropped for non-payment for two years	6		
Resigned	3		
		23	
			222
Present membership			785

INCOME FROM MEMBERSHIP.

23 new Life Members @ $30	$690 00
8 " Annual Members @ $10	80 00
8 commuted to Life @ $20	160 00
Annual assessments	418 00
	$1,348 00

CHARLES E. RICHARDSON, *Treasurer.*

Dr. *Massachusetts Horticultural Society in account with the Proprietors of the Cemetery of Mt. Auburn.* **Cr.**

For Sales and Improvements within the Cemetery for the year ending December 31, 1895.

To cost of filling up and improving land at Mt. Auburn for the year ending December 31, 1895, the Massachusetts Horticultural Society being charged with their proportion of the same:			By sales in January		$385 00
Birch, to Eagle and Cherry Avenues	$120 94		" " February		545 00
Larch Avenue	247 88		" " March		—
Glen Avenue	491 44		" " April		1,190 00
	$860 26		" " May		2,298 00
			" " June		1,516 00
One quarter of $860.26 is	$215 07		" " July		538 00
Balance due Mass. Horticultural Society	2,308 03		" " August		385 00
		$2,523 10	" " September		906 40
			" " October		420 00
			" " November		1,490 00
			" " December		845 00
					$10,518 40
			Net amount received from Receiving Tomb		974 00
					$11,492 40
			Deduct for Annual Expenses		1,400 00
					$10,092 40
		$2,523 10	Mass. Horticultural Society ¼ part of $10,092.40		$2,523 10

E. & O. E.

DECEMBER 31, 1895.

H. B. MACKINTOSH, *Treasurer.*

THE MASSACHUSETTS HORTICULTURAL SOCIETY
To the PROPRIETORS OF THE CEMETERY OF MOUNT AUBURN, *Dr.*

For one-fourth part of the following Expenditures, for grading new lands for sale during the year 1895:

Birch to Eagle and Cherry Avenues

52½ days, men	$118 13	
¾ day, man and horse	2 81	
		$120 94

Larch Avenue (near Maple Avenue).

31 days, men	69 75	
47½ days, man and horse	178 13	
		247 88

Glen Avenue.

208 days, men	468 00	
6¼ days, man and horse	23 44	
		491 44
		$860 26
One-fourth of $860.26 is		$215 07

MOUNT AUBURN, December 31, 1895.

JAMES C. SCORGIE,
Supt. of the Cemetery of Mount Auburn.

I certify the foregoing to be a true copy of improvements for the year 1895, rendered by the Superintendent.

H. B. MACKINTOSH, *Treasurer.*

Massachusetts Horticultural Society.

OFFICERS AND STANDING COMMITTEES FOR 1896.

President.
FRANCIS H. APPLETON, of Peabody.

Vice-Presidents.
CHARLES H. B. BRECK, of Brighton. WALTER HUNNEWELL, of Wellesley.
AUGUSTUS PARKER, of Roxbury. BENJAMIN P. WARE, of Clifton.

Treasurer and Superintendent of the Building.
CHARLES E. RICHARDSON, of Cambridge.

Secretary and Librarian.
ROBERT MANNING, of Salem.*

Professor of Botany and Vegetable Physiology.
BENJAMIN M. WATSON, of Jamaica Plain.

Professor of Entomology.
SAMUEL H. SCUDDER, of Cambridge.

Delegate to the State Board of Agriculture.
E. W. WOOD, of West Newton.

*Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

Standing Committees.

Executive.

THE PRESIDENT, FRANCIS H. APPLETON, CHAIRMAN.
THE CHAIRMAN OF THE FINANCE COMMITTEE, H. H. HUNNEWELL, *Ex officio.*

WILLIAM C. STRONG.
WILLIAM H. SPOONER.
NATHANIEL T. KIDDER.
BENJAMIN C. CLARK.
WALTER HUNNEWELL.
CHARLES W. PARKER.
CHARLES F. CURTIS.

Finance.

H. HOLLIS HUNNEWELL, OF BOSTON, CHAIRMAN.

FRANCIS H. APPLETON.
AUGUSTUS HEMENWAY.

Lectures and Publication.

J. D. W. FRENCH, OF BOSTON, CHAIRMAN.

C. MINOT WELD.
BENJAMIN M. WATSON.

Library.

WILLIAM E. ENDICOTT, OF CANTON, CHAIRMAN.

GEORGE W. HUMPHREY.
WALTER S. PARKER.
EDWIN FAXON.
GEORGE E. DAVENPORT.

Plants.

AZELL C. BOWDITCH, OF SOMERVILLE, CHAIRMAN.

JAMES COMLEY.
JAMES WHEELER.
WILLIAM ROBINSON.
WILLIAM J. MARTIN.

Flowers.

J. WOODWARD MANNING, JR., OF READING, CHAIRMAN.

MICHAEL H. NORTON.
KENNETH FINLAYSON.
THOMAS C. THURLOW.
FREDERICK S. DAVIS.

Fruits.

E. W. WOOD, OF WEST NEWTON, CHAIRMAN.

CHARLES F. CURTIS.
WARREN FENNO.
J. WILLARD HILL.
O. B. HADWEN.
SAMUEL HARTWELL.
SUMNER COOLIDGE.

Vegetables.

CHARLES N. BRACKETT, OF WATERTOWN, CHAIRMAN.

CEPHAS H. BRACKETT.
VARNUM FROST.
WALTER RUSSELL.
P. G. HANSON.
WARREN H. HEUSTIS.
AARON LOW.

Gardens.

JOHN G. BARKER, of Jamaica Plain, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, VEGETABLES, AND ARRANGEMENTS, *Ex officiis.*

HENRY W. WILSON. JACKSON DAWSON.

For Establishing Prizes.

WILLIAM J. STEWART, of Winchester, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, VEGETABLES, AND GARDENS, *Ex officiis.*

MRS. P. D. RICHARDS.

Committee of Arrangements.

JOSEPH H. WOODFORD, of Boston, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, VEGETABLES, AND GARDENS, *Ex officiis.*

ROBERT FARQUHAR.

MEMBERS FOR LIFE.

Members of the Society and all other persons who may know of deaths, changes in residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to members whose names are marked thus †.

Adams, Luther, Brighton.
Albro, Charles, Taunton.
Alger, Rev. R. F., Becket.
Allan, David, Boston.
Allen, Hon. Charles H., Lowell.
Ames, Frank M., Canton.
Ames, George, Boston.
Ames, Oakes, 2d, North Easton.
Ames, Preston Adams, Boston.
Amory, Charles, Boston.
Amory, Frederick, Boston.
Andrews, Charles L., Milton.
Andrews, Frank W., Washington, D. C.
Andros, Milton, San Francisco, Cal.
Appleton, Edward, Reading.
Appleton, Francis H., Peabody.
Appleton, William S., Boston.
Ash, John, Pomfret, Conn.
Atkins, Edwin F., Belmont.
Avery, Hon. Edward, Boston.
Ayling, Isaac, M. D., Brookline.

Bailey, Jason S , West Roxbury.
Bancroft, John C., Boston.
Banfield, Francis L., M. D., Worcester.
Barber, J. Wesley, Newton.
Barnard, James M., Malden.
Barnard, Robert M., Everett.
Barnes, Walter S., Somerville.
Barnes, William H., Boston.
†Barney, Levi C., Boston.
Barratt, James, East Pasadena, Cal.
Barrett, Edwin S., Concord.
Barry, William C., Rochester, N. Y.
Bartlett, Edmund, Newburyport.
Bates, Hon. Amos, Hingham.
Beal, Leander, Boston.
Becker, Frederick C., North Cambridge.
Beckford, Daniel R., Jr., Jamaica Plain.
Beebe, E. Pierson, Boston.
Beebe, Franklin H., Boston.
Beebe, J. Arthur, Boston.
Berry, James, Brookline.
Birchard, Charles, Framingham.
Black, James W., Cambridge.
Blake, Francis, Weston.
Blake, Frederick A., Rochdale.
Blakemore, John E., Roslindale.
Blanchard, John W., Dorchester.
Blaney, Henry, Salem.
Blinn, Richard D., Chicago, Ill.
Bliss, William, Boston.
Boardman, Samuel M., Milton.
Bocher, Prof. Ferdinand, Cambridge.
Bockus, Charles E., Dorchester.
Bosler, Frank C., Carlisle, Penn.
†Botume, John, Wyoming.
Bouvé, Thomas T., Boston.
Bowditch, Azell C., Somerville.
Bowditch, Charles P., Jamaica Plain.

Bowditch, James H., Brookline.
Bowditch, Nathaniel I., Framingham.
Bowditch, William E., Roxbury.
Bowker, William H., Boston.
Brackett, Cephas H., Brighton.
Brackett, Charles N., Watertown.
Bresee, Albert, Hubbardton, Vt.
Brewer, Francis W., Hingham.
Brigham, William T., Honolulu, Hawaii.
Brimmer, Martin, Boston.
Brooks, J. Henry, Milton.
Brown, Alfred S., Jamaica Plain.
Brown, Charles E., Yarmouth, N. S.
Brown, Edward J., Weston.
Brown, George Barnard, Brookline.
Brown, George Bruce, Framingham.
Brown, Jacob, Woburn.
Brown, John T., Newburyport.
Bullard, John R., Dedham.
Bullard, William S., Boston.
Burnett, Harry, Southborough.
Burr, Fearing, Hingham.
Burr, Matthew H., Hingham.
Buswell, Edwin W., Brooklyn, N. Y.
Buswell, Frank E., Brooklyn, N. Y.
Butler, Aaron, Wakefield.
Butler, Edward K., Jamaica Plain.

Cabot, Edward C., Brookline.
†Cadness, John, Flushing, N. Y.
Cains, William, South Boston.
Calder, Augustus P., Boston.
Campbell, Francis, Cambridge.
Capen, John, Boston.
Carlton, Samuel A., Boston.
Carr, Hon. John, Roxbury.
Carter, Charles N., Boston.
Carter, Miss Maria E., Woburn.
Cartwright, George, Dedham.
Chadbourne, Marshall W., Mount Auburn.
Chaffin, John C., Newton.
Chamberlain, Chauncey W., Boston.
†Chase, Andrew J., Lynn.
Chase, Daniel E., Somerville.
Chase, George B., Boston.
Chase, William M., Everett.
Cheney, Mrs Elizabeth S., Wellesley.
Child, Francis J., Cambridge.
Childs, Nathaniel R., Boston.
Choate, Charles F., Southborough.
Christie, William, Newton.
Claflin, Hon. William, Newtonville.
Clapp, Edward B., Dorchester.
Clapp, James H., Dorchester.
Clapp, William C., Dorchester.
Clark, Benjamin C., Boston.
Clark, J. Warren, Rockville.
Clarke, Miss Cora H., Jamaica Plain.
Cleary, Lawrence, West Roxbury.
Clough, Micajah Pratt, Lynn.
Cobb, Albert A., Brookline.
Cobb, John C., Milton.
Coburn, Isaac E., Everett.
Codman, James M., Brookline.
Codman, Ogden, Lincoln.
Coffin, G. Winthrop, West Roxbury.
Collamore, Miss Helen, Boston.
Converse, Elisha S., Malden.
Converse, Parker L., Woburn.
Coolidge, Joshua, Mount Auburn.
Cottle, Henry C., Boston.
Cowing, Walter H., West Roxbury.
Cox, Thomas A., Dorchester.
Coy, Samuel I., Boston.
Crawford, Dr. Sarah M., Roxbury.
Crocker, Miss S. H., Boston.
Crosby, George E., West Medford.
†Crowell, Randall H., Chelsea.
Cummings, Hon. John, Woburn.
Curtis, Charles F., Jamaica Plain.
Curtis, George S., Jamaica Plain.
Cushing, Livingston, Weston.
Cushing, Robert M., Boston.

†Daggett, Henry C., Boston.
Damon, Samuel G., Arlington.
Dana, Charles B., Wellesley.
Davenport, Albert M., Watertown.
Davenport, Edward, Dorchester.
Davenport, George E., Medford.
Davenport, Henry, New York.

Davis, John, Lowell.
Dawson, Jackson, Jamaica Plain.
Day, William F., Roxbury.
Dee, Thomas W., Mount Auburn.
Denny, Clarence H., Boston.
Denton, Eben, Dorchester.
Dewson, Francis A., Newtonville.
Dexter, F. Gordon, Boston.
Dickerman, George H., Somerville.
Dike, Charles C., Stoneham.
Doliber, Thomas, Brookline.
Dorr, George, Dorchester.
Dove, George W. W., Andover.
Dowse, William B. H., West Newton.
Draper, Hon. Eben S., Hopedale.
Durant, William, Boston.
Durfee, George B., Fall River.
Dutcher, Frank J., Hopedale.

Eaton, Horace, Cambridge.
Edgar, William W., Waverly.
Eldredge, H. Fisher, Boston.
†Eldridge, E. H., Roxbury.
Eliot, Charles, Brookline.
Ellicott, Joseph P., Boston.
Elliot, Mrs. John W., Boston.
Elliott, William H., Brighton.
Endicott, William E., Canton.
Endicott, William, Jr., Boston.
Everett, William, Dorchester.
Ewell, Warren, Dorchester.

Fairchild, Charles, Boston.
Falconer, William, Pittsburgh, Pa.
Farlow, Lewis H., Newton.
Farquhar, James F. M., Roslindale.
Farquhar, John K. M. L., Roxbury.
Farquhar, Robert, Boston.
Faxon, John, Quincy.
Fewkes, Arthur H., Newton Highlands.
Finlayson, Kenneth, Brookline.
Fisher, David, Montvale.
Fisher, James, Roxbury.
†Fisher, Warren, Roxbury.
Flagg, Augustus, Boston.
Fletcher, George V., Belmont.
Fletcher, John W., Chelsea.
Fletcher, J. Henry, Belmont.
Flint, David B., Boston.
Forster, Edward J., M. D., Boston.
Foster, Francis C., Cambridge.
Fottler, John, Jr., Dorchester.
Fowle, George W., Jamaica Plain.
Fowle, William B., Auburndale.
French, Jonathan, Boston.
French, J. D. Williams, Boston.
French, S. Waldo, Jamaica Plain.
French, W. Clifford, Newton.
Frohock, Roscoe R., Malden.

Galloupe, Charles W., Swampscott.
Galvin, John, Boston.
Gardner, George A., Boston.
Gardner, George P., Boston.
†Gardner, Henry N., Mount Auburn.
Gardner, John L., Brookline.
Gibbs, Wolcott, M. D., Newport, R. I.
Gill, George B., Medford.
Gillard, William, Harrison Square, Dorchester.
Gilmore, E. W., North Easton.
Gilson, F. Howard, Reading.
Glover, Albert, Boston.
Glover, Joseph B., Boston.
Goddard, A. Warren, Brookline.
Goddard, Joseph, Sharon.
Goddard, Mrs. Mary T., Newton.
Goodell, L. W., Dwight.
Gorham, James L., Jamaica Plain.
†Gould, Samuel, Boston.
Gowing, Mrs. Clara E., Kendall Green.
Gray, James, Wellesley.
Gregory, Hon. James J. H., Marblehead.
Greig, George, Toronto, Ontario.
Grey, Benjamin, Malden.
Guild, J. Anson, Brookline.

Hadwen, Obadiah B., Worcester.
Hall, Edwin A., Cambridgeport.
Hall, George A., Chelsea.
Hall, George R., M. D., Warren, R. I.
Hall, Lewis, Cambridge.

Hall, Stephen A., Revere.
Hall, William F., Brookline.
Halliday, William H., South Boston.
Hammond, Gardiner G., New London, Conn.
Hammond, George W., Boston.
Hammond, Samuel, Boston.
Hanson, P. G., Woburn.
†Harding, George W., Arlington.
Harding, Louis B., Stamford, Conn.
Hardy, F. D., Cambridgeport.
Harris, Charles, Cambridge.
Harris, Thaddeus William, A. M., Keene, N. H.
Hart, William T., Boston.
Harwood, George Fred, Newton.
Haskell, John C., Lynn.
Hastings, Levi W., Brookline.
Hatch, Mrs. C. S., North Cambridge.
Hatch, Edward, Boston.
Hathaway, Seth W., Marblehead.
Hawken, Mrs. Thomas, Rockland, Maine.
†Hazeltine, Hazen, Boston.
Hemenway, Augustus, Canton.
Henshaw, Joseph P. B., Boston.
Hews, Albert H., North Cambridge.
Heywood, Hon. George, Concord.
Hilbourn, A. J., Boston.
Hill, John, Stoneham.
Hittinger, Jacob, Mount Auburn.
Hoar, Samuel, Concord.
Hodgkins, John E., Portsmouth, N. H.
Hoitt, Hon. Charles W., Nashua, N. H.
Hollingsworth, Amor L., Milton.
Hollis, George W., Grantville.
Hollis, John W., Allston.
Holmes, Edward J., Boston.
Holt, Mrs. Stephen A., Winchester.
Horner, Mrs. Charlotte N. S., Georgetown.
Horsford, Miss Kate, Cambridge.
Hovey, Charles H., Pasadena, Cal.
Hovey, Stillman S., Woburn.
Hubbard, Charles T., Weston.
Hubbard, Gardiner G., Washington, D. C.
Hubbard, James C., Everett.
Humphrey, George W., Dedham.
Hunnewell, Arthur, Wellesley.
Hunnewell, Henry Sargent, Wellesley.
Hunnewell, H. Hollis, Wellesley.
Hunnewell, Walter, Wellesley.
Hunt, Dudley F., Reading.
Hunt, Francis W., Melrose.
†Hunt, Franklin, Boston.
Hunt, William H., Concord.
Hyde, James F. C., Newton Highlands.

Jack, John George, Jamaica Plain.
Jackson, Charles L., Cambridge.
Jackson, Robert T., Dorchester.
Janvrin, William S., Revere.
Jeffries, John, Boston.
Jenks, Charles W., Bedford.
Johnson, J. Frank, Boston.
Jose, Edwin H., Cambridgeport.
Joyce, Mrs. E. S., Medford.

Kakas, Edward, West Medford.
Kelly, George B., Jamaica Plain.
Kendall, D. S., Woodstock, Ont.
Kendall, Edward, Cambridgeport.
†Kendall, Joseph R., San Francisco, Cal.
Kendall, Dr. Walter G., Atlantic.
Kendrick, Mrs. H. P., Allston.
Kennedy, George G., M.D., Roxbury.
Kent, John, Brookline.
†Keyes, E. W., Denver, Col.
Keyes, John M., Concord.
Kidder, Charles A., Southborough.
Kidder, Nathaniel T., Milton.
†Kimball, A. P., Boston.
King, Franklin, Dorchester.
Kingman, Abner A., Brookline.
Kingman, C. D., Middleborough.
Kinney, John M., Boston.
Knapp, Walter H., Newtonville.

Lancaster, Charles B., Newton.
Lawrence, Amory A., Boston.
Lawrence, Amos A., Boston.
Lawrence, James, Groton.
Lawrence, John, Groton.
Learned, Charles A., Arlington.
Lee, Charles J., Dorchester.
Lee, Daniel D., Jamaica Plain.
Lee, Henry, Boston.
Leeson, Hon. Joseph R., Newton Centre.
Lemme, Frederick, Charlestown.
Leuchars, Robert B., Boston.
Lewis, William G., Framingham.
Lincoln, George, Hingham.
Lincoln, Col. Solomon, Boston.
Little, James L., Brookline.
Lockwood, Rhodes, Boston.
Lodge, Richard W., Swampscott.
Loftus, John P., Dorchester.
Loring, Caleb W., Beverly Farms.
Lovett, George L., West Newton.
†Lowder, John, Watertown.
Lowell, Augustus, Boston.
Luke, Elijah H., Cambridgeport.
Lumb, William, Boston.
Lunt, William W., Hingham.
Lyman, George H., Wareham.
Lyman, Col. Theodore, Brookline.
Lyon, Henry, M. D., Charlestown.

†Mahoney, John, Boston.
Mallet, E. B., Jr., Freeport, Maine.
Mann, James F., Ipswich.
Manning, Jacob W., Reading.
Manning, Mrs. Lydia B., Reading.
Manning, Robert, Salem.
Manning, Warren H., Brookline.
Marshall, Frederick F., Chelsea.
Matthews, Nathan, Boston.
McCarty, Timothy, Providence, R. I.
McClure, John, Revere.
McWilliam, George, Whitinsville.
Melvin, James C., West Newton.
Merriam, Herbert, Weston.
Merriam, M. H., Lexington.
Merrifield, William T., Worcester.
Merrill, Hon. Moody, Roxbury.
Metivier, James, Cambridge.
Milmore, Mrs. Joseph, Washington, D. C.
Minton, James, Boston.
Mixter, George, Boston.
Monteith, David, Dedham.
Moore, John H., Concord.
†Morse, Samuel F., Boston.
Mudge, George A., Portsmouth, N. H.
Murphy, William Bowen, Boston.

Nevins, David, Framingham.
Newman, John R., Winchester.
Newton, Rev. William W., Pittsfield.
Nickerson, George A., Dedham.
Norton, Charles W., Allston.
Norton, Edward E., Boston.

Oakman, Hiram A., North Marshfield.
Olmsted, John Charles, Brookline.

Packer, Charles H., Boston.
Paige, Clifton H., Mattapan.
Paige, John C., Boston.
Palmer, Julius A., Jr., Boston.
Parker, Augustus, Roxbury.
Parker, Charles W., Boston.
Partridge, Horace, North Cambridge.
Paul, Alfred W., Dighton.
Peabody, Francis H., Boston.
Peabody, John E., Boston.
Peabody, Col. Oliver W., Milton.
Pearce, John, West Roxbury.
Peck, O. H., Denver, Col.
Peck, William G., Arlington.
Peirce, Silas, Boston.
Perkins, Edward N., Jamaica Plain.
†Perry, George W., Malden.
Philbrick, William D., Newton Centre.
Pierce, Dean, Brookline.
Pierce, George Francis, Dorchester.
Pierce, Henry L., Boston.
Poor, John R., Boston.

Porter, Herbert, Malden.
Porter, James C., Wollaston.
Potter, Joseph S., Fredericksburg, Va.
Prang, Louis, Roxbury.
Pratt, Laban, Dorchester.
Pratt, Lucius G., West Newton.
Pratt, Robert M., Boston.
Pratt, William, Winchester.
Pray, Dr. Mark W., Boston.
†Prescott, Eben C., Boston.
Prescott, William G., Quincy.
Pringle, Cyrus G., Charlotte, Vt.
Prouty, Gardner, Littleton.
Putnam, Joshua H., Brookline.

Quinby, Hosea M., M. D., Worcester.

Raddin, Everett W., North Cambridge.
Rand, Miss Elizabeth L., Newton Highlands.
Rand, Harry S., North Cambridge.
Rand, Oliver J., Cambridgeport.
Rawson, Warren W., Arlington.
Ray, James F., Franklin.
Ray, Hon. James P., Franklin.
Ray, Hon. Joseph G., Franklin.
Raymond, Walter, Cambridgeport.
Read, Charles A., Manchester.
Reardon, John B., Boston.
Reed, George W., Boston.
Rice, George C., Worcester.
Richards, John J., Boston.
Richardson, Charles E., Cambridge.
Rinn, J. Ph., Boston.
Ripley, Charles, Dorchester.
Ripley, Ebed L., Hingham Centre.
Robbins, I. Gilbert, Melrose Highlands.
Robinson, John, Salem.
Robinson, Joseph B., Allston.
Robinson, Warren J., Somerville.
Ross, Henry, Newtonville.
Ross, Waldo O., Boston.
Ruddick, William H., M. D., South Boston.
Russell, George, Woburn.
Russell, Hon. John E., Leicester.
Russell, Walter, Arlington.

Salisbury, William C. G., Boston.
Sanford, Oliver S., Hyde Park.
Sargent, Charles S., Brookline.
Saville, Richard L., Brookline.
Sawtelle, Eli A., Boston.
Sawyer, Timothy T., Boston.
†Scott, Charles, Newton.
Sears, Miss Clara E., Boston.
Sears, J. Montgomery, Boston.
Shaw, Christopher C., Milford, N. H.
Shorey, John L., Lynn.
Shuman, Hon. A., Roxbury.
Siebrecht, H. A., New Rochelle, N.Y.
Skinner, Francis, Boston.
Smith, Benjamin G., Cambridge.
Smith, Calvin W., Wellesley Hills.
Smith, Charles H., Jamaica Plain.
Smith, Charles S., Lincoln.
Smith, Edward N., San Francisco.
Smith, George O., Boston.
Smith, Thomas Page, Waltham.
Snow, Eugene A., Melrose.
Snow, Miss Salome H., Brunswick, Me.
Spaulding, Edward, West Newton.
Spaulding, Hon. John P., Dorchester.
Speare, Alden, Newton Centre.
Spooner, William H., Jamaica Plain.
Springall, George, Malden.
Stearns, Frank W., Newton.
Stewart, William J., Winchester.
Stone, Amos, Charlestown.
Stone, Charles W., Boston.
Stone, George F., Chestnut Hill.
Strater, Herman, Roxbury.
Strong, William C., Waban.
Sturgis, Russell, Manchester.
Sturtevant, E. Lewis, M. D., South Framingham.
Surette, Louis A., Concord.
Swain, Charles E., Roxbury.
Swett, Evarell F., Malden.

Taft, John B., Cambridge.
Talbot, Mrs. I. Tisdale, Boston.
Tarbell, George G., M. D., Boston.
Taylor, Horace B., Portland, Me.
Temple, Felker L., Boston.
Thompson, Leonard, Woburn.
Thurlow, Thomas C., West Newbury.
Tilton, Stephen W., Roxbury.
Todd, John, Hingham.
Tolman, Benjamin, Concord.
Torrey, Everett, Charlestown.
Trepess, Samuel J., Brookline.
†Turner, John M., Dorchester.
Turner, Roswell W., Boston.

Underwood, William J., Belmont.

Vander-Woerd, Charles, Waltham.
Vinal, Miss Mary L., Somerville.

Wainwright, William L., Braintree.
Wakefield, E. H., Cambridge.
Walcott, Henry P., M.D., Cambridge.
Waldo, C. Sidney, Jamaica Plain.
Wales, George O., Braintree.
Walker, Edward C. R., Roxbury.
Walker, Miss Mary S., Waltham.
Walley, Mrs. W. P., Boston.
Walton, Daniel G., Wakefield.
Ward, Francis Jackson, Roxbury.
Ward, John, Newton Centre.
Wardwell, William H., Brookline.
Ware, Benjamin P., Clifton.
Ware, Miss Mary L., Boston.
Washburn, Andrew, Hyde Park.
Waters, Dr. George F., Boston.
Watson, Benjamin M., Jamaica Plain.
Watson, Thomas A., East Braintree.
Watts, Isaac, Waverly.
Webber, Aaron D., Boston.
Weld, Christopher Minot, Jamaica Plain.
Weld, George W., Newport, R. I.
Weld, Richard H., Boston.
Weld, William G., Boston.
West, Mrs. Maria L., Neponset.
Weston, Leonard W., Lincoln.
Weston, Seth, Revere.
Wheeler, Frank, Concord.
Wheelwright, A. C., Brookline.
Whitcomb, William B., Medford.
White, Francis A., Brookline.
White, Joseph H., Brookline.
Whitney, Arthur E., Winchester.
Whitney, Ellerton P., Milton.
Whitten, Charles V., Dorchester.
Whittier, Hon. Charles, Roxbury.
Wilbur, George B., West Newton.
Wilder, Edward Baker, Dorchester.
Wilder, Henry A., Malden.
Willard, E. W., Newport, R. I.
Willcutt, Levi L., West Roxbury.
Williams, Aaron D., Boston.
Williams, Benjamin B., Boston.
Williams, Philander, Taunton.
Willis, George W., Chelsea.
Willis, Joshua C., Roxbury.
Wilson, Col. Henry W., Boston.
Wilson, William Power, Boston.
Winthrop, Robert C., Boston.
Wood, Luke H., Marlborough.
Wood, William K., West Newton.
Woods, Henry, Boston.
Wright, George C., West Acton.
Wyman, Oliver B., Shrewsbury.

ANNUAL MEMBERS.

Members of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Abbott, Samuel L., M. D., Boston.
Allen, Charles L., Floral Park, N.Y.
Alles, William H., Hyde Park.
Arnold, Mrs. Anna E., Roxbury.
Atkinson, Edward, Brookline.

Bacon, Augustus, Roxbury.
Badlam, William H., Dorchester.
Barker, John G., Jamaica Plain.
Beard, Edward L., Cambridge.
Benedict, Washington G., Boston.
Bigelow, Arthur J., Eastlake, Worcester.
Bigelow, Mrs. Nancy J., Southborough
Bird, John L., Dorchester.
Bird, Mrs. Sarah Elizabeth, Roxbury.
Bliss, Benjamin K., East Bridgewater.
Bock, William A., North Cambridge.
Bolles, Matthew, Boston.
Bolles, William P., Roxbury.
Boyden, Clarence F., Taunton.
Breck, Charles H., Newton.
Breck, Charles H. B., Brighton.
Brooks, George, Brookline.
Brown, David H., West Medford.
Butler, Edward, Wellesley.

Carroll, James T., Chelsea.
Carter, Mrs. Sarah D. J., Wilmington.
Chase, Joseph S., Malden.
Chase, Leverett M., Roxbury.
Chase, Philip A., Lynn.
Cheney, Amos P., Natick.
Chubbuck, Isaac Y., Roxbury.
Clapp, Henry L., Roxbury.
Clark, John Spencer, Boston.
Clark, Joseph, Manchester.
Clark, Theodore M., Newtonville.
Codman, Philip, Brookline.
Coleman, Mrs. S. H., Jamaica Plain.
Collins, Frank S., Malden.
Comley, James, Lexington.
Coolidge, David H., Jr., Boston.
Coolidge, Sumner, Mt. Auburn.
Cotter, Lawrence, Dorchester.
Councilman, Prof. W. T., Boston.
Crosby, J. Allen, Jamaica Plain.
Curtis, Joseph H., Boston.
Curtis, Louville, Tyngsborough.

Davis, Frederick, Boston.
Davis, Frederick S., West Roxbury.
Davis, Thomas M., Cambridgeport.
Dimick, Orlendo W., Watertown.
Dolbear, Mrs. Alice J., College Hill.
Doran, Enoch E., Brookline.
Doyle, William E., East Cambridge.
Duffley, Daniel, Brookline.

Eaton, Warren E., Reading.
Endicott, Miss Charlotte M., Canton.
Ewell, Marshall F., Marshfield Hills.

Faxon, Edwin, Jamaica Plain.
Felton, Arthur W., West Newton.
Fenno, Warren, Revere.
Fisher, Sewall, Framingham.
Fitzgerald, Desmond, Brookline.
Fletcher, Fred W., Auburndale.

Forbes, William H., Jamaica Plain.
French, Charles G., Utica, N. Y.
Frost, Artemas, Belmont.
Frost, George, West Newton.
Frost, Varnum, Arlington.
Fuller, T. Otis, Needham.

Gage, Alfred P., Arlington.
Gibbon, Mrs. James A., Brookline.
Gill, Mrs. E. M., Medford.
Grant, Charles E., Concord.
Grosvenor, Clarence E., Brooklyn, N. Y.

Haile, Hon. William H., Springfield.
Hall, Charles H., M. D., Boston.
Hall, Harry B., Dorchester.
Hall, Stacy, Boston.
Hall, William T., Revere.
Hargraves, William J., Jamaica Plain.
Harris, Miss Ellen M., Jamaica Plain.
Harris, Frederick L., Wellesley.
Hartwell, Samuel, Lincoln.
Hatfield, T. D., Wellesley.
Henshaw, Samuel, West Brighton, N. Y.
Hersey, Alfred H., Hingham.
Hersey, Edmund, Hingham.
Heustis, Warren H., Belmont.
Hewett, Miss Mary C., Canton.
Hill, Edwin S., Hyde Park.
Hill, J. Willard, Belmont.
Hobbs, George M., Boston.
Hollis, George, South Weymouth.
Horton, Herbert A., Brookline.
Houghton, George S., West Newton.
Hubbard, F. Tracey, Cambridge.
Hunt, Henry C., Newton.
Huston, Miss Katharine W., Roxbury.

James, Robert Kent, Dorchester.
Jameson, G. W., East Lexington.
Jordan, Hon. Jediah P., Roxbury.

Keith, Miss Mary R., Wollaston.
Kelley, Augustus H., Allston.
Kenrick, Miss Anna C., Newton.

Lancaster, Mrs. E. M., Roxbury.
Langmaid, Mrs. Mary, Somerville.
Lawrence, Henry S., Roxbury.
Lee, Francis H., Salem.
Lee, William W., Northampton.
Lomax, George H., Somerville.
Lombard, Richard T., Wayland.
Loring, Charles G., Boston.
Loring, John A., North Andover.
Lothrop, Thornton K., Boston.
Loud, Mrs. Mary E., Roxbury.
Low, Hon. Aaron, Hingham.
Lowell, John, Newton.

Manda, W. A., South Orange, N. J.
Manning, A. Chandler, Reading.
Manning, J. Woodward, Reading.
Markoe, George F. H., Roxbury.
Martin, William H., Dorchester.
Martin, William J., Milton.
Masten, Cornelius E., Roxbury.
May, F. W. G., Boston.
McDermott, Andrew, Roxbury.
McDowell, Mrs. Mary, Cambridge.
McLaren, Anthony, Forest Hills.
McMullen, Edgar, Boston.
Meredith, Albert A. H., Milton.
Meriam, Horatio C., D.M.D., Salem.
Merrill, John J., Roxbury.
Milman, William, Roxbury.
Munson, Prof. W. M., Orono, Me.

Newton, John F., Roxbury.
Nicholson, William, Framingham.
Norton, Michael H., Boston.
Norton, Patrick, Boston.

Olmsted, Frederick Law, Brookline.

Park, William D., Boston.
Park, William P., West Boxford.
Parker, John, Newtonville.
Parker, Walter S., Reading

Patterson, William, Quincy.
Peirce, George H., Concord.
Peterson, Ellis, Jr., Jamaica Plain.
Petremant, Robert, New York, N. Y.
Pickman, Dudley L., Boston.
Pigott, Thomas E., Winthrop.
Plimpton, Willard P., West Newton.
Power, Charles J., South Framingham.
Prichard, Joseph V., Dorchester.
Purdie, George A., Wellesley Hills.
Putnam, Charles A., Salem.

Rich, Miss Ruth G., Dorchester.
Rich, William E. C., Roxbury.
Rich, William P., Chelsea.
Richards, Mrs. P. D., West Medford.
Robbins, Oliver R., Weston.
Robinson, Walter A., Arlington.
Robinson, William, North Easton.
Ross, Charles W., Newtonville.
Ross, Henry Wilson, Newtonville.
Rothwell, James E., Brookline.

Saunders, Miss Mary T., Salem.
Sawtell, J. M., Fitchburg.
Schmitt, Georg A., Boston.
Scott, Augustus E., Lexington.
Scudder, Samuel H., Cambridge.
Seaver, Edwin P., LL.D., Waban.
Sharples, Stephen P., Cambridge.
Shaw, Hon. Edward P., Newburyport.
Shedd, Abraham B., Waltham.
Sheppard, Edwin, Lowell.
Slade, Dr. Daniel D., Chestnut Hill.
Smith, Archibald, Somerville.
Souther, Charles H., Jamaica Plain.
Southworth, Edward, Quincy.
Squire, Miss Esther A., North Cambridge.
Stearns, Mrs. Charles A., East Watertown.
Stearns, Charles H., Brookline.
Stevens, Miss Mary O., North Andover.
Stone, Joshua C., Watertown.
Storer, Charles, Boston.
Story, Miss Sarah W., Allston.
Swan, Charles W., M. D., Boston.

Tailby, Joseph, Wellesley.
Talbot, Josiah W., Norwood.
Teele, William H., West Acton.
Terry, Rev. Calvin, North Weymouth.
Tobey, Rufus T., Roxbury.
Tobey, S. Edwin, Boston.
Travis, Charles B., Brighton.
Turner, Nathaniel W., Boston.
Tyndale, Theodore H., Brookline.

Vaughan, J. C., Chicago, Ill.

Warren, Samuel H., Weston.
Welch, Patrick, Dorchester.
Weld, Charles E., Roslindale.
Wells, Benjamin T., Newtonville.
Weston, Mrs. L. P., Danvers.
Westwood, Thomas H., Jamaica Plain.
Wheeler, James, Brookline.
White, Maurice P., Roxbury.
White, W. Henry, Lowell.
Whitney, Joseph, Cambridgeport.
Whiton, Hon. Starkes, Hingham Centre.
Wilcox, George D., M. D., Providence, R. I.
Wilmarth, Henry D., Jamaica Plain.
Wilson, B. Osgood, Watertown.
Winter, William C., Mansfield.
Wolcott, Mrs. Henrietta L. T., Dedham.
Wood, Mrs. Anna D., West Newton.
Wood, Elijah A., West Newton.
Wood, E. W., West Newton.
Woodford, Joseph H., Boston.
Woods, Henry F., Boston.
Worthington, Roland, Roxbury.

Young, Arthur W., Hingham.
Young, Charles S., Newton Centre.
Young, E. Bentley, Boston.

Zirngiebel, Denys, Needham.

EXTRACTS FROM THE CONSTITUTION AND BY-LAWS.

SECTION XXII.

Life Members.

The payment of thirty dollars shall constitute a Life Membership, and exempt the member from all future assessments, and any annual member, having paid all dues, may become a Life Member by the payment of twenty dollars in addition thereto.

Annual Membership.

Every annual member, before he receives his diploma, or exercises the privileges of a member, shall pay the sum of ten dollars as an admission fee, and shall be subject afterwards to an annual assessment of two dollars.

SECTION XXIII.

Withdrawal or Discontinuance of Membership.

Any member may withdraw from the Society, on giving notice to the Treasurer and paying the amount due from him. Any member who shall neglect for the space of two years to pay his annual assessment, after due notice from the Treasurer, shall cease to be a member. The Treasurer shall give notice of such withdrawals or discontinuances to the Secretary, who shall erase such members' names from the list.

The attention of Annual Members is particularly called to Section XXIII.

HONORARY MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Joseph Maxwell, *elected in* 1830, *and* George W. Smith, *elected in* 1851.

Hon. George S. Boutwell, Groton.
H. W. S. Cleveland, Chicago, Ill.
Hon. Joseph S. Fay, Wood's Holl.
Joseph Jefferson, Buzzard's Bay.
Major L. A. Huguet-Latour, M. P., Montreal, Canada.
Edward Winslow Lincoln, Secretary of the Worcester County Horticultural Society.
Col. Theodore Lyman, Brookline.
Joseph Maxwell, Rio Janeiro, Brazil.
Donald G. Mitchell, New Haven, Conn.
Hon. J. Sterling Morton, Secretary of Agriculture, Washington, D. C.
Baron R. Von Osten Sacken, Heidelberg, Germany.
Samuel B. Parsons, Flushing, N. Y.
Samuel R. Payson, Boston.
George W. Smith, Boston.

CORRESPONDING MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly reporting to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Alexander Burton, *elected in* 1829, S. Reynolds, M. D., 1832, *and* Francis Summerest (or Summerer), 1833.

Édouard André, Editor in Chief of the Revue Horticole, Paris, France.

Professor L. H. Bailey, Cornell University, Ithaca, N. Y.

Charles Baltet, President de la Société Horticole, Vigneronne, et Forestière de l'Aube, Troyes, France.

Napoleon Baumann, Bolwiller, Alsace.

D. W. Beadle, 303 Crawford St., Toronto, Ontario.

Professor William J. Beal, Agricultural College, Michigan.

Prosper J. Berckmans, President of the American Pomological Society, Augusta, Ga.

Charles E. Bessey, Ph.D., Professor of Botany in the Industrial College of the University of Nebraska, Lincoln.

Dr. Ch. Bolle, Berlin, Prussia.

John Croumbie Brown, LL.D., Haddington, Scotland.

Professor J. L. Budd, Secretary of the Iowa Horticultural Society, Ames.

William Bull, Chelsea, England.

Alexander Burton, United States Consul at Cadiz, Spain, Philadelphia.

Isidor Bush, Bushberg, Jefferson Co., Mo.

George W. Campbell, President of the Ohio State Horticultural Society, Delaware, O.

Maxime Cornu, Director of the Jardin des Plantes, Paris, France.

Benjamin E. Cotting, M. D., Boston.

Daniel T. Curtis, Dorchester.

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Andrew S. Fuller, Ridgewood, N. J.

Hon. Robert W. Furnas, Ex-President of the Nebraska State Horticultural Society, Brownville.

Charles A. Goessmann, Ph.D., Director of the State Agricultural Experiment Station, Amherst.

George L. Goodale, M. D., Professor of Botany, Harvard University, Cambridge.

Obadiah B. Hadwen, Ex-President of the Worcester County Horticultural Society, Worcester.

Professor Byron D. Halsted. Botanist and Horticulturist at the New Jersey Agricultural Station. New Brunswick, N. J.

J. H. Hart, Superintendent of the Botanic Garden, Trinidad.

Robert Hogg, LL.D., Editor of the Journal of Horticulture, London.

J. C. Holding, Ex-Treasurer and Secretary of the Cape of Good Hope Agricultural Society, Cape Town, Africa.

Rev. S. Reynolds Hole, Rochester, England.

Sir Joseph Hooker, K.C.S.I., The Camp, Sunningdale, England.

Josiah Hoopes, West Chester, Pa.

George Husmann, Napa, Cal.

William J. Johnson, M.D., Fort Gaines, Ga.

Charles Joly, Vice-President of the Société Nationale d'Horticulture de France, Paris.

Dr. George King, Superintendent of the Royal Botanic Garden, Calcutta.

Professor William R. Lazenby, Secretary of the Agricultural Experiment Station, Columbus, O.

Max Leichtlin, Baden-Baden, Germany.

G. F. B. Leighton, President of the Norfolk Horticultural and Pomological Society, Norfolk, Va.

Victor Lemoine, Nancy, France.

J. Linden, Ghent, Belgium.

T. T. Lyon, President of the Michigan Horticultural Society, South Haven.

Dr. P. MacOwan, Director of the Botanic Garden, Cape Town, Africa.

Dr. Maxwell T. Masters, Editor of the Gardeners' Chronicle, London.

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Robert W. Starr, Port William, N. S.
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William A. Stiles, Editor of Garden and Forest, Deckertown, N. J.
William Sumner, Pomaria, S. C.
Francis Summerest.
William Trelease, Director of the Missouri Botanic Garden, St. Louis.
Dr. Melchior Treub, Director of the Botanic Garden, Buitenzorg, Java.
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Henry L. de Vilmorin, Secretary of the Société Nationale d'Agriculture de France, Paris.
Anthony Waterer, Knap Hill, near Woking, Surrey, England.

ERRATA.

In part I, page 135, line 17, for *rubra* read *Robur*, and in line 19, after *rubra*, insert "or the," so that the sentence shall read *Quercus Robur* is best for most of the oaks, although I believe the red oaks would do better on *Q. rubra* or the var. *tinctoria*.

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